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# **Innovation policy in seven candidate countries: the challenges. Final Report Volume 2.1 Innovation Policy Profile: Bulgaria**

Rossitsa Chobanova

EC - Enterprise Directorate-General

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## **Innovation policy in seven candidate countries: the challenges**

### **Final Report**

Volume 2.1

**Innovation Policy Profile: Bulgaria**



*March 2003*

ADE s.a.  
Rue de Clairvaux, 40  
B-1348 Louvain-la-Neuve  
Belgium  
Tél.: +32 10 45 45 10  
Tél.: +32 10 45 40 99  
E-mail: [ade@ade.be](mailto:ade@ade.be)  
Web : [www.ade.be](http://www.ade.be)

Compiled by: Rossitsa Chobanova

Study coordinated by ADE

In association with SSEES AND LOGOTECH



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# Table of Contents

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<b>INTRODUCTION AND ACKNOWLEDGEMENTS .....</b>	<b>9</b>
<b>SECTION 1 - THE INNOVATION POLICY FRAMEWORK.....</b>	<b>11</b>
1.1 ECONOMIC TRANSITION, ACCESSION AND INNOVATION POLICY .....	11
1.1.1 Economic reform and transition to a market economy: impact on innovation .....	12
1.1.2 Analysis of key indicators of innovation performance for Bulgaria .....	18
1.2 MAIN DEVELOPMENTS IN INNOVATION POLICY .....	21
1.3 THE INNOVATION POLICY COMMUNITY.....	25
1.4 ASSESSING INNOVATION POTENTIAL: DATA COLLECTION, SURVEYS AND INDICATORS.....	30
1.4.1 Innovation potential – statistical figures and comments .....	30
1.4.2 Assessment of innovation potential in Bulgaria: business point of view .....	34
1.4.3 Innovative potential of “dynamic” and “academic” SME’s.....	35
1.5 LEGAL AND ADMINISTRATIVE ENVIRONMENT FOR INNOVATION .....	37
1.5.1 Legal environment .....	37
1.5.2 Specific measures undertaken to alleviate the administrative burden .....	38
1.5.3 Corporate taxation policy .....	39
<b>SECTION 2 - MEASURES TO IMPROVE THE ENVIRONMENT FOR INNOVATION .....</b>	<b>41</b>
2.1 TEACHING AND TRAINING INITIATIVES IN FAVOUR OF AN INNOVATION AND ENTERPRISE CULTURE .....	41
2.1.1 Trends for supply of skilled human resources .....	41
2.1.2 Education initiatives in favour of an innovation and enterprise culture.....	44
2.1.3 Institutional framework for teaching and training initiatives in favour of an innovation and enterprise culture in Bulgaria.....	46
2.1.4 Training and education institutions in Bulgaria in favour of innovation and enterprise culture.....	48
2.2 INITIATIVE IN FAVOUR OF THE UPTAKE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN ENTERPRISES.....	55
2.2.1 ICT business in Bulgarian economy .....	55
2.2.2 Development of information society policy.....	57
2.2.3 Potential to uptake ICT in enterprises and initiatives for its improvement .....	59
<b>SECTION 3 - BUSINESS INNOVATION INTERFACES AND SUPPORT MEASURES .....</b>	<b>61</b>
3.1 RESEARCH COMMUNITY – INDUSTRY CO-OPERATION .....	61
3.2 SUPPORT FOR START-UPS AND NEW TECHNOLOGY BASED FIRMS.....	63
3.3 BUSINESS NETWORKS FOR INNOVATION .....	66
<b>SECTION 4 - CONCLUSIONS AND POLICY OPINIONS .....</b>	<b>69</b>
4.1 KEY CONCLUSIONS BULGARIA .....	69
4.1.1 Overall evaluation of framework conditions for business innovation intensity in Bulgaria .....	70
4.2 MAIN STEPS TO DEVELOPING AN INNOVATION POLICY IN BULGARIA .....	71
4.2.1 Promoting a culture open to innovation in the country.....	71
4.2.2 Place innovation at the hard of further reforms to the legal and regulatory environment.....	71
4.2.3 Increase the number and level of innovativeness of smaller enterprises.....	71

4.2.4	Strengthen diffusion of knowledge and technology in the economy .....	72
4.2.5	Establish a policy making process conducive to developing innovation policy .....	72
<b>ANNEXES .....</b>		<b>73</b>
ANNEX 1 - LIST OF PEOPLE INTERVIEWED* .....		73
ANNEX 2 - LIST OF DOCUMENTS RECEIVED AND CONSULTED.....		75

## LIST OF TABLES

Table 1 - High-tech Products in first 50 Bulgarian export commodities.....	18
Table 2 - Indicators of innovation performance in enterprises in Bulgaria.....	20
Table 3 - Main policy documents and consultative papers since 1996.....	22
Table 4 - Major Government funded programmes and initiatives in favour of innovation.....	25
Table 5 - Government funded agencies .....	27
Table 6 - Main innovation support providers .....	28
Table 7 - Annual data on Research and Development activities.....	32
Table 8 - Inventory of surveys undertaken by research groups .....	34
Table 9 - Legislative measures in favour of innovation .....	37
Table 10 - Bulgarian graduated students .....	43
Table 11 - Bulgarian students in advanced research (Ph.D.) programmes .....	43
Table 12 - Scientists by field of science in business sector as of 31.12.1999 .....	44
Table 13 - Organisations involved in human resource development for innovation – examples of initiatives for implementation of innovation related training programmes .....	53
Table 14 - Some initiatives for human resource development in Bulgaria .....	54
Table 15 - Initiatives taken in favour of the uptake of ICTs - summary .....	58
Table 16 - Forms and activities for research – business cooperation .....	62
Table 17 - Main initiatives taken in favour of start-ups .....	64
Table 18 - Additional Initiatives taken in favour of start-ups promotion and entrepreneurship .....	65
Table 19 - Some initiatives taken in favour of inter-firm co-operation .....	67

## LIST OF BOXES

Box 1 - Recent debates in higher-education concerning the improvement of innovation support environment in Bulgaria.....	27
Box 2 - VET system in Bulgaria .....	46
Box 3 - Bulgarian Industrial Association's policy objective on Vocation education and training .....	48
Box 4 - Ministry of economy measures to improve the environment for human resources for enterprises .....	52
Box 5 - Strong demand for ITC related degrees.....	60

## LIST OF FIGURES

Figure 1 - Average age of equipment.....	36
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## Introduction and acknowledgements

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The present report is an analysis of the innovation policy profile of Bulgaria prepared under the study on “Innovation Policy in Seven Candidate Countries: The Challenges”. The study was carried out for the countries Bulgaria, Slovakia, Latvia, Lithuania, Malta, Romania, and Turkey. It covers developments mainly since 1996, but in some cases, longer periods are included in order to illustrate special issues regarding the country or to use officially published statistics. Where no official reports or evaluation studies existed, other public financed studies or surveys by international funding agencies and academic organisations were used.

The study was divided into three stages. Three interim reports were prepared in January, May and September 2002, respectively.

For the preparation of the interim and final reports, in addition to the documentary analysis, face-to-face or phone interviews were also conducted with policy-makers, business representatives, entrepreneurs and representatives of innovation support organisations. In addition, during August and September 2002, an opinion survey was carried out with a sample of 50 companies and private sector stakeholders. The purpose of the survey was to collect opinions mainly in three areas; firstly, on the influence of the legal and economic environment on business innovation; secondly, to seek the views of the private actors on current policy developments and specific measures in favour of innovation; and, thirdly, to ascertain views with respect to networks and diffusion mechanisms in the innovation system. On October 12 2002, an innovation policy workshop was organised with representatives of innovative companies, chambers, industrial federations, policy-makers and innovation support organisations. The purpose of the workshop was to provide a forum for debate on the initial national conclusions and analysis and also on the results of the opinion survey.

The present report is divided into four sections. The *first section* presents information on the innovation policy framework of Bulgaria; the trends in terms of economic transition and accession; main developments in innovation policy; actors of the innovation policy community; initiatives taken to monitor and collect data on innovation; and legal and administrative environment for innovation. Findings on the analysis of education and training initiatives in favour of innovation and on the uptake of information and communication technologies are described in the *second section*. *Section three* analyses business innovation interfaces and support measures, looking in detail at the research community-industry co-operation and the support for start-ups and new technology based firms and business networks for innovation. *Section four* presents the conclusions, which summarize and highlight a number of key issues arising from the study that was conducted mainly during the period 2001 to November 2002 through the literature review, interviews, an opinion survey and an innovation policy workshop. *Conclusions* refer to the legal and economic framework for innovation, priorities and infrastructure support measures, state of the art, performance and networks for business for innovation. Also, the main framework conditions influencing innovation intensity in the country are assessed and priorities for innovation policy are identified. Specific trajectories of NIS support in the country are summarized and the main steps to developing an innovation policy in Bulgaria are identified.

This report was prepared with the cooperation and support of the Bulgarian experts participated in the multinational panel meetings; participants of the opinion survey; policy-makers, business representatives, entrepreneurs and representatives of innovation support organisations interviewed, and participants of innovation policy workshop. The cooperation and support of all above mentioned actors is gratefully acknowledged. Also, special thanks to the members of the core team (ADE, SSEES and LOGOTECH) for their support and guidance during the course of the study.





## Section 1 - The innovation policy framework

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Twelve years after the beginning of the economic transition and accession processes, the first signs of the development of a national innovation policy in Bulgaria can be observed. From the initial focus on building and expanding research and development capacity, a gradual trend towards the adoption of a more complete and explicit vision of the role of innovation in economic development has taken place during 2002<sup>1</sup>.

The objective of this chapter is to briefly recall the relevant position of Bulgaria in terms of the main economic and technological indicators with respect to the current 15 EU Member States and the seven candidate countries (CC7) concerned by this study; to describe the main developments of innovation policy; to provide an overview of data collection, survey and indicators for assessing innovation potential; and to present the main issues concerning the legal and administrative environment for innovation in the country.

### 1.1 Economic transition, accession and innovation policy

By 2002, the first phase of transition process in Bulgaria was finalised with the most important political and economic institutions being re-established. In its 2002 report, the Commission concluded that Bulgaria is a functioning market economy<sup>2</sup>. The main challenges now are to cope with the competitive pressures and market forces within European Union (EU) in the medium term. Innovation has to play a major role in meeting these challenges. This premise is supported by the fact that the Bulgarian economy is going into its sixth year of stable conditions, having established a satisfactory track record of macroeconomic performance.

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<sup>1</sup> More specifically, a project of the Ministry of Economy and Ministry of Education and Science 'Innovation strategy of Republic of Bulgaria and measures for its realisation' was published (<http://www.mi.government.bg>) at the end of October 2002. Among the topics discussed in this document are: financing innovation, creation of innovative SMEs, innovation management, etc.. The document also proposes new actors for coordinating state innovation policy formation and implementation have been proposed.

<sup>2</sup> See: Report of the European Commission on the progress towards accession by each of candidate countries, Brussels, 09.10.2002, SEC/2002/1400-1412

### 1.1.1 Economic reform and transition to a market economy: impact on innovation

Overall, the recent progress of economic transition in Bulgaria<sup>3</sup>, is characterised by the following:

- Functioning market economy;
- High level of macroeconomic stability;
- Sufficiently working market mechanisms which allow for a better allocation of resources;
- Good progress in structural reforms, especially regarding procedures for market entry, restructuring of the financial sector and privatisation, thus setting the microeconomic basis for a process of sustainable growth.

Expectations for an improved economic performance were raised by the election of a new Government, which was formed following the victory of the Simeon II National Movement, in June 2001. The first measures announced by the Prime Minister concerned notably a radical tax reform, the enhancement of the speed, transparency and efficiency of the privatisation process, an increase of the minimum monthly salary by 15% and the setting up of a State guarantee fund of €10 million for micro-credits, which nevertheless is not yet in place. The new Government strongly supports the EU membership and as is outlined in section 1.2, it has made a significant step towards developing an explicit innovation policy.

#### *Recent trends in economic performance*

A number of key trends in the economic performance of the country during the period 1997 to 2001 are worth highlighting in respect to the potential improvement of innovation performance.

- The average annual change of Gross Domestic Product (GDP) growth in Bulgaria<sup>4</sup> is 2.0% for the respective period, which is 3 times lower than the leader country Latvia, with a 6.1%. GDP per capita remains among the lowest in the Candidate Countries at only 24% of the EU's average in 2000 and limits significantly the potential demand for new innovative products at national level.
- A comparative analysis of inflation in Bulgaria and the other CC shows that the hyperinflation shock at the beginning of 1997 had affected negatively innovative activities. More specifically, business R&D expenditure, for the period

***Inflation in 1996-1997 has affected negatively innovation activities, more specifically – business R&D expenditures. For the period 1995 – 1999 their share decreased from 1/2 to 1/5 of the total R&D expenditures.***

<sup>3</sup> See: previous source and Report of the European Commission on the progress towards accession by each of candidate countries" (Brussels, 13.11.2001, SEC/2001/1744-1753).

<sup>4</sup> Sources: Eurostat and Commission services calculations from national resources.

**High levels of unemployment are a drag on productivity and suggests a significant waste in terms of human capital potential for innovation.**

1995-1999 decreased from approximately half to one fifth of the total R&D expenditure. However, decreasing inflation since 2000 provides new opportunities for improving the framework in favour of an innovation policy, although the level is still relatively high. The average inflation rate during 1997-2001 was 9.8% and the country holds 8<sup>th</sup> place among the CC13; behind Hungary with 12.4%, Poland with 9.9%, Romania with 46.3% and Turkey with 69.9%.

- Unemployment is a major concern, with Bulgaria having the highest rate amongst the candidate countries in 2001 at 19.9% of the labour force. Such high levels of unemployment are a drag on productivity and suggests a significant waste in terms of human capital potential for innovation.
- The general Government budget balance stood at 1.7% of GDP in 2001 and was the only positive indicator among the CC13. This is a positive characteristic of macroeconomic performance. However, Government budget restrictions may be at the expense of being able to develop a more pro-active Government policy, notably in the field of innovation.
- The ratio between the categories of GDP final consumption is unfavourable in respect to better innovation performance. The relative share of final consumption is still high, even through it decreased in 2000 to 89.9% (by 0.8 points in comparison with the preceding year). The exports of goods and services and the investments are the basis of the economic growth in 2000. The relative share of investments in the GDP final consumption increased in 2000 and reached 16.2%, but it is still insufficient to ensure the necessary base for technological transformation of production and stable economic growth.
- Good progress has also been made in the privatisation process, especially in the banking sector by promoting structural reforms and setting the microeconomic basis for innovation activities. However, investment remains insufficient and financial intermediation continues to be low and inefficient<sup>5</sup>, which becomes a barrier to the improvement of a Bulgarian NIS.

### **Foreign direct investment**

Foreign direct investment is an important factor for innovation performance. FDI is not sufficient in Bulgaria, which is ranked fifth amongst the CC. Using the indicator net inflow as a % of GDP for the period 1997 – 2001 it is 5.1% in 2001. However, using the indicator stock of FDI per capita for 2001 the country is in 9<sup>th</sup> place (with 272 euro) which is 8.4 times lower than the

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<sup>5</sup> Report of the European Commission on the progress towards accession by each of candidate countries” (Brussels, 13.11.2001, SEC/2001/1744-1753).

***Bulgaria is a trend leader in inward FDI/GDP among the 13 candidate countries with a change of 180.9%.***

leader (Czech Republic) with 2,284 euro per capita. The recent data show that Bulgaria is a trend leader in inward FDI/GDP among the 13 candidate countries with a change of 180.9%<sup>6</sup>. This raises some expectations for better innovation performance in the near future.

There is evidence that the macroeconomic policy of currency stability has, since 1997, led to some growth in inward FDI but has been associated with further declines in the country's own business funded R&D. The indigenous sources of technology have been almost totally bypassed, by an admittedly smaller quantity of FDI.

The emerging 'assimilationist' view of technology advance in catching-up countries emphasises that there have to be active domestic responses to FDI, in entrepreneurship, labour markets, and institutional arrangements as Ireland has positively demonstrated. Relying on 'embodied' technology through FDI does not seem sufficient.

### ***Private sector development***

The private sector has played an increasingly important role in the economy and innovation performance in Bulgaria. This view is justified by the official data and figures for investment and surveys, presented below.

- The gross value added, created by the private sector in 2000 increased by 14.2% in comparison with the preceding year. Its related share reaches 69.3% of the value added in the economy, which is 3.9 points more than 1999. In comparison to 1990, taken as the beginning of the transition to the market economy, the total increase of the private sector is more than 3.5 times. During the last three years (1998-2000), private sector accounts for over 60% of the service sector. As a result of the privatisation process in industry, private sector in the services industry increased its relative share from 53.3% in 1999 to 68.2% of the total value added in 2000.
- The relative share of employment in the private sector from 5.9% (241.6 thousands) in 1990 reached 70.1% (2 063.0 thousands) in 2000 and its absolute growth was 8.5 times.

In 2000 the predominant part of investment was the private sector and its relative share reached 62.1% of total amount of the investment activity, which is determined by the continuing privatisation of enterprises.

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<sup>6</sup> European Commission, Cordis focus, European Innovation Scoreboard 2002, p. 15.

### *Industrial enterprise sector development and SMEs*

The early transition period affected negatively Bulgarian industrial enterprises with respect to innovation performance. However, the downward trend in the output of industrial enterprises after 1996 was interrupted in 2000: production in 2000 reached 83.5% of that of 1995.

SMEs<sup>7</sup> play a significant role for industrial development as they represent 99% of the total number of active companies in Bulgaria<sup>8</sup>. The share of SMEs in the total Gross Value Added<sup>9</sup> gradually increased from 22,4% in 1997 to 30.7% in 1999. In 1999, growth was higher in micro enterprises and the value added generated by this size group increased on average by 50% in current prices. Growth of value added is smaller as the size class of the enterprises increases. Large enterprises have registered a decrease in generated value added in 1999 compared to 1998.

***The main source of growth in the economy has been the development of the SMEs.***

More concretely, in terms of innovation performance by sectors, SMEs are very important in IT and software industries. They have also significant share in education and business services.

### *Productivity*

Productivity is a general indicator, affecting the innovative performance of countries. One of the factors affecting productivity is the level of production technology and equipment and their differences among sectors and the highly skilled personnel. In the case of Bulgaria, productivity growth cannot be supported due to the low level of technology and equipment in the production line. In this way the skills of the personnel available cannot be used.

However, in 2000 one employed person in the national economy produced, on average, about 4000 Euro<sup>10</sup> of the current volume of GDP. A comparison of the indices of GDP and of employed people shows an ***increase of the labour productivity*** in 2000 by 12%, while in 1999 this growth was 6.4% and in 1998 – 4.7%. The gross value added per employee in 2000 increased by 13.3% in

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<sup>7</sup> According to the Bulgarian legislation micro enterprises are those with employment less than 10 people; small enterprises – with employment between 11 and 50 people; medium enterprises – with employment between 51 and 100 people; and large enterprises – with employment above 100.

<sup>8</sup> A recent analysis of the place and role of SME's in Bulgarian economy has been carried out by Bulecoproject Ltd., commissioned by the World Bank.

<sup>9</sup> Defined as a sum of the operating profit of the enterprises, the compensations of employees (includes the gross wages and all other payments connected to the wage such as social contributions, unemployment insurance, etc.) and the expenditures on depreciation. It is only a proxy of the term of the Gross Value Added used in the System of National Accounts.

<sup>10</sup> Bulgarian currency – Lev was fixed to German mark in June, 1997 and now – to Euro by the Law. Exchange rate used for conversion into Euro is 0,511249.

comparison with the preceding year. Labour productivity has increased more rapidly in micro enterprises – by 46%<sup>11</sup>. The growth of labour productivity was lower in large enterprises. The highest labour productivity is in the electricity, water supply and gas sectors, where the share of public companies is the highest. Regarding the geographical distribution, productivity has decreased in most of the regions. The highest values of productivity in SMEs are found in Sofia, Bourgas and Varna and the lowest in Montana and Vidin.

#### Key finding

The increase of productivity taking place after 2000 is connected with higher level of investment and innovation activities in specific areas.

### Finance and investment

Lack of investment is the main barrier to innovation according to all surveys dealing with the subject in Bulgaria. This fact is connected with specific developments during the last decade. Recent years have shown some more positive trends in this area.

**Until 2000, trade banks practically did not provide long-term credits for enterprises, including SMEs. Short-term credits were given for turnover purposes with the provision of guarantees (between 150% and 200% of the required credit value).**

In 1996/1997 Bulgaria went through a very deep financial crisis. Until 2000, trade banks practically did not give long-term credits to enterprises, including SMEs. Short-term credits were given for turnover purposes with the provision of guarantees (between 150% and 200% of the required credit value). In the year 2000, the relative share of long-term credits grew up to almost five times those of 1999. Gross fixed capital formation as a percentage of GDP grew significantly (1996–8.4%, 1997– 11.4%, 1998–16.9%, 1999–19.0%, for 2000–16.5%, for 2001–20.4%<sup>12</sup>). However, experts from BAS suggest<sup>13</sup>, that about 30% capital formation rate is needed in order to be able to achieve levels of performance adequate to becoming a member of EU.

The macroeconomic stabilisation of the economy favours a high demand for credits. But a large number of projects offered do not meet the formal requirements set up by the banks for crediting. The problems could be summarised as follows: a) Not enough credit guarantee, b) Poor financial state of enterprise, and c) Lack of market strategy.

<sup>11</sup> NSI, Bulecoproject Ltd. Calculations.

<sup>12</sup> Source: National Statistical Institute and <http://www.nsi.government.bg>

<sup>13</sup> Source: <http://www.iki.bas.bg> – Publications of Prof. Ivan Angelov

Further efforts to improve the efficiency of the administrative and legal system for higher levels of private and public investment are taking place. More specifically: a) administrative procedures affecting the enterprise sector, including bankruptcy procedures are streamlined; b) the level of financial intermediation continues to be low; c) the loan market – specific deficiencies remaining are to be overcome<sup>14</sup>.

### *Foreign trade*

The overall situation in Bulgarian foreign trade has affected positively innovation performance, but by far less than the expectations expressed in the beginning of the 90s.

More specifically, the level of foreign trade turnover of Bulgaria was 12309 MEuro in 2000. It increased by 18.7% in comparison with 1999 and by 23.6% compared to 1998. The foreign trade balance was negative for 2000 at 12785 MEuro. This trend continues.

The relative share of the imports and exports of commodities and services in GDP is increasing and in 2000 was 58.8% for the exports and 64.1% for imports respectively. European countries are the main trade partners of Bulgaria with nearly half of its turnover with European Union members. Bulgaria's main trade partners from the EU are Italy, Germany, Greece and Belgium. For Italy, Greece and Belgium, exports are higher than imports, while imports from Germany are twice as high as exports.

***An important characteristic of innovation performance of the country is that in-house R&D specialization corresponds to the export's specialization.***

An important characteristic of innovation performance of the country is that the in-house R&D specialisation corresponds to the specialisation of the exports. Bulgarian main exports include mainly processed and finished products, chemical products and fuels, machines and equipment. Several main commodity groups – fuels, flat-rolled products of iron, clothes and wines took a leading place in Bulgarian exports during the latest years. They formed a quarter of the total volume of exports in 2000. The most significant branch of R&D is the “manufacturing of chemicals and chemical products”, concentrating 35.9% of total R&D expenditure in manufacturing<sup>15</sup>. The importance of chemical industries is also significant.

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<sup>14</sup> Report of the European Commission on the progress towards accession by each of candidate countries” (Brussels, 13.11.2001, SEC/2001/1744-1753).

<sup>15</sup> <http://www.ced.bg> (2001).



**Table 1 - High-tech Products in first 50 Bulgarian export commodities**

	Average export value (USD x 1000)	% in total exports
Oil lubricants	225247.7	5.32
Soda ash	66649.9	1.57
Medicines	56851	1.34
Tooth paste	37641.8	0.89
Polyethylene	34535.6	0.82
Bearings, gears, gearing elements	29921.4	0.71
Ammonia nitrogen	29457.3	0.70
Polypropylene	24450.5	0.58
Ethylene glucole	23767.2	0.56
Machine parts, apparatuses	18325.7	0.43
Cosmetic products	17795.7	0.42
Antibiotics	14844.9	0.35
<b>Total</b>	<b>579489.2</b>	<b>13.68</b>

Source: CED (2001, p. 131)<sup>16</sup>.

Large enterprises obtain the largest share in foreign trade. The share of SMEs in exports<sup>17</sup> is moderate, connected with specific non tariff barriers like the lack of certificates ISO 9000, (no more than 320 Bulgarian companies are ISO certified); lack of established marketing channels, trade marks, etc.

### 1.1.2 Analysis of key indicators of innovation performance for Bulgaria<sup>18</sup>

The relative position of the county in terms of comparable data on innovation for the EU-15 and the thirteen candidate countries is presented in a separate synthesis working paper produced as part of this overall study on Innovation Policy in Seven Candidate Countries<sup>19</sup>. The main conclusions to be drawn from this working paper and the European Innovation Scoreboard (EIS) 2002 are the following:

<sup>16</sup> <http://www.ced.bg>

<sup>17</sup> Data from the SME Report, ASME, Bulgaria, 2000, p.59.

<sup>18</sup> See Innovation market in Bulgaria, Economic Thought, 2001 – in English.

<sup>19</sup> See Volume 2.8 of the report on Innovation Policy in Seven Candidate Countries: the challenges. (European Commission, DG Enterprise, 2003).

***Bulgaria is leader for three indicators for trends in innovation performance – for population with tertiary education and inward FDI/ GDP and in home Internet access.***

According to the available data<sup>20</sup>, Bulgaria is a trend leader for three indicators of innovation performance; (a) for population with tertiary education; (b) inward FDI/ GDP; and (c) in home Internet access. Also, human resources for innovation in Bulgaria are on average at good level among the CC7. More specifically:

- New science and engineering graduates account for 4.73% of the 20-29 year old population. It puts the country in second place after Latvia. This percentage is approximately the same as those of Hungary (4.49), Latvia (5.52) and Poland (5.9), but half that of the E.U level (10.26).
- The percentage of working age population (25-64) with a tertiary education in Bulgaria is 21.29% while the EU average is 21.22%. The country is a trend leader among the CC13. The level of this indicator – 17.8% is the same as EU average – 17.9%. This is a good precondition for better innovation performance.
- On average, 5.50% of the total employment is in medium-high and hi-tech manufacturing where as the EU average is 7.57%. In addition, employment in hi-tech services (NACC 64, 72-73) is 2.71% of the total employment with the EU average at the level of 3.61%. There are policy measures to increase the level of both indicators.
- Public R&D funding is 0.41% of GDP (GOVERD + HERD) in the country. Bulgaria is third in respect to CC7 after Latvia and Turkey. The public funding on R&D is two-thirds of the EU average (0.67%). Business expenditures on R&D as a percentage of GDP (BERD) is 0.11% placing Bulgaria in the 5<sup>th</sup> place among the CC7. Businesses in the country spend on R&D 10 times less than the EU average, which is 1.28%. BERD has decreased very sharply in the 90s, and more concretely after 1996.
- There is no official data on the number of EPO patent applications in high-tech sectors per million population (pharmaceuticals, biotechnology, information technology and aerospace). When comparing the performances of EPO patent applications per million population, for Bulgaria is 3.2. The country is in the second place after Slovakia among 7CCs, but is far behind the EU average which is 152.7. The number of Bulgarian USPTO patent applications in high-tech classes per million population (pharmaceuticals, biotechnology, information technologies and aerospace) is 0.12, ten times less than the EU average (12.4).

There is no official data for the process of transmission and application of new knowledge in Bulgaria, as NSI does not provide innovation surveys. Some data for the processes were obtained from private sources. A recent survey, organised in 2002

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<sup>20</sup> European Commission, European Innovation Scoreboard 2002, Cordis focus, <http://www.cordis.lu>

provides some data, which in some respect gives information about the current processes of application and transmission of knowledge. Among 56 enterprises, 75% have had innovation projects during the last 3 years. Innovative activities were performed by 62% of micro-enterprises (less than 10 employees), 90% of small enterprises (10-49 employees) and 60% of medium enterprises (50-99 employees). The study concluded that, in general, small firms are more innovative than large firms in Bulgaria.

**Table 2 - Indicators of innovation performance in enterprises in Bulgaria**

Size of firm	% of innovative firms	% of innovative firms involved in cooperative innovation (in-house and/or with cooperation)	% of firms involved in co-operative innovation
Micro firms	62	50	0
Small firms	90	78	56
Medium sized	60	30	30

*Source: Rossitsa Chobanova*

The survey suggests that the majority of the innovative enterprises (75,5%) spend between 1% and 4% of their total turnover on R&D. The tendencies, which occur, are as follows: Small firms are more innovative and better prepared for cooperative innovation than micro-firms; innovations are predominantly 'small', in other words, those, which need little funding.

There are no data on the main indicators for innovation financing in Bulgaria. Some expert opinions were used to describe the situation in the country making possible to proceed to comparisons with EU. More specifically, this problem is discussed in section 4, where the results of the enterprises opinion survey are summarised.

The first indicator is hi-technology venture capital investment in technology firms as a percentage of GDP. The EU average level is 0.242. For Bulgaria the volume of venture capital is negligibly small. The new capital raised in the parallel market along with capital raised by new firms in main market as a % of GDP is also negligibly small. The average EU level is 1.73. Also no real conclusion can be made on 'New to the market' products (% of sales by manufacturing firms).

Home Internet access (% of all households) is 7.5%. Bulgaria is in the third place after Slovakia and Malta, and far behind the EU average, which is 37.7%. This indicator depends on some specific factors, such as the age profile of the population (Bulgaria has a relatively large share of older people which are not able to buy computers for their households). More analysis in that respect is presented in section 2.2.

The share of information and communication technologies (ICT) expenditures as a percentage of GDP is 3.8% lower than half the EU average (8.0%). The share of manufacturing value added in hi-tech sectors is 5.90, which is also half the EU average (10.1%). In addition, inward FDI/GDP is 26.4, which is close to the EU average (30.3%).

#### Key findings

Bulgaria performs well in terms of human resources for innovation. However, the public and business R&D expenditures allowing the exploitation of this human potential for creation of knowledge are insufficient. The transmission and application of knowledge is more intensive in small firms, than in micro and middle ones. The insufficient financial resources and institutional infrastructure (as described in the third section) act as barriers for more intensive application of new knowledge. Access to and efficiency of current instruments for innovative finance is not sufficient to stimulate higher rate of business innovation.

- For innovation performance in the country, SMEs and large companies in the IT, software, education and business sectors, are of higher importance.
- The State has to play a significant role for the development of science and technology, especially in creating channels for technology transfer between Academia and industry. There is a need to develop a more clear innovation policy towards an effective national innovation system, creating a competitive environment favouring innovation demand in business sector, in-house and from abroad.

## 1.2 Main developments in innovation policy

While much of the effort of the country is focused on adopting the more technical aspects of the '*acquis communautaire*', the Government also puts efforts in developing a policy framework liable to support the creation of an appropriate "environment for innovation".

- Support of science and technology and further development of the innovative potential are essential elements in strengthening competitiveness, employment and secure economic growth<sup>21</sup>. The 2000 Commission Report *Communication on Innovation in a knowledge-driven economy*<sup>22</sup> stresses the attention on explicitly defined goals and specific measures for innovation policy in any country defined by the official policy statements, and on the improvement of the regulatory framework so that it becomes more conducive to

<sup>21</sup> The OECD formulated this view in 1995 by stating: "*Knowledge in all its forms plays today a crucial role in economic processes. Intangible investment is growing much more rapidly than physical investment. Firms with more knowledge are winners on markets. Nations endowed with more knowledge are more competitive.*" All Western economies adhere to this philosophy and are adjusting their policies in accordance. The European Union Summit Conference in Lisbon in 2000 endorsed this view unanimously. In addition, it was stated that the European Union was to strive for developing into the economically most competitive region of the world by the year 2010.

<sup>22</sup> COM (2000) 567, 20/9/2000. The document can be downloaded from <http://www.cordis.lu/innovation-smes/communication2000/home.html>

innovation. At the European Summit Conference in Barcelona in 2002 it was also stated that the European countries should increase their R&D expenditure to an average of 3% of GDP. All the above create some specific framework conditions to which candidate countries should react.

Bulgaria has a substantial science and technology base, a long tradition of science and technology policy making and many examples of innovative companies. During the last 13 years several policy documents and projects concerning innovation policy were prepared, and related programmes were launched (see table below). However, the level of implementation is poor and lags behind the proclaimed policy declarations maintaining insufficient innovativeness in the Bulgarian economy.

**Table 3 - Main policy documents and consultative papers since 1996**

Title of document	Organisation responsible	Legal status	Comments
Law for encouraging research investigations.	Ministry of education and science	Project	Encouragement of R&D in the country.
Science, Technology and Innovation in Republic of Bulgaria. Strategy and implementation.	Ministry of economy and Ministry of Education and Science	Project October 2002	Project, based on the cooperation between the Ministries of Economy, Education and Science and other Ministries and experts from the Netherlands. Funding is based on expectations for average 6% GDP growth and for a loan from the World bank and R&D intensity in 2010 ( $\frac{1}{2}$ of the Barcelona target – 1.5%).
Action Plan of the Government “People are the wealth of Bulgaria”.	Government	Adopted in October 2001	Education and science are among priorities, as well as hi-tech development.
National strategy for high-tech development in Bulgaria.	Ministry of economy	1999, Government decision	Some actions are foreseen by the Ministry of economy (Prepared Law on high-tech parks – status: under discussion, etc.).
Strategy for Information society development.	Ministry of economy	1999 Government decision	Some actions are foreseen by the Ministry of economy – now, before – by Ministry of telecommunications (Law on electronic signature, 2001, etc.).

Some of the priorities of the recent Bulgarian Government<sup>23</sup> under the Governmental programme “People are the wealth of Bulgaria” underline some directions towards a more specific innovation policy in the country. These directions are mainly framed in terms of: Industrial policy, Telecommunication development, and Science and education. The programme suggests integration of research and education, support of long life learning and development of a substantial R&D policy. In October 2002, the Ministry of economy and Ministry of Education and Science published the result of a *project for Science, Technology and Innovation (STI) Policy*<sup>24</sup> that was developed together with senior civil servants and an expert team from the Netherlands<sup>25</sup>. Its *aims* are to: a) Strengthen the competitiveness of Bulgaria’s industry through science, technology and innovation; b) Strengthen the science and technology sector through co-operation and concentration and intensifying the relationship with industry; c) Provide a favourable environment for keep Bulgarian graduates in science and technology in Bulgaria. This policy paper is the first that explicitly suggests actions in favour of an innovation policy in the country.

To achieve these goals the paper suggests *four types of action*: a) Strengthening the so-called National Innovation System, that is, all institutions, companies and organisations involved in the development, transfer and implementation of know how; b) Ensuring collaboration between the science/technology sector and the business sector. (This extends to cooperation between the Ministries of Economy, Education and Science and other Ministries); c) Creating a national organisation with the charter to coordinate the adoption and execution of STI Policy. This includes a National Council for Science, Technology and Innovation, composed of the responsible ministries and of entrepreneurs and scientists/technologists, as well as an executive body for the implementation of STI Policy; d) Adequate funding to finance the actions required.

According to the same document, STI Policy in Bulgaria is to be focussed on 16 concrete actions. These include among others:

- The establishment of a Science Fund for financing promising scientific research projects;
- The establishment of a Technology Fund for financing R&D projects on behalf of combinations of scientific institutes and companies;

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<sup>23</sup> See: Key priorities of the Government programme “People are the wealth of Bulgaria” <http://www.government.bg>, also Newsletter of Union of Scientists in Bulgaria, 2001, Nov 15/1.

<sup>24</sup> <http://www.mi.government.bg>

<sup>25</sup> This project was made available under the Bulgarian-Dutch bilateral assistance programme PSO.

- Subsidising the employment of graduates in science/technology in SMEs;
- Strengthening the Bulgarian Foreign Investment Agency (BFIA) to enable it to acquire foreign R&D-intensive activities;
- The development of a Technology Development Credit scheme to finance product development in small firms;

In addition, a National Council for Science, Technology and Innovation is to be established to represent the national innovation system and to govern Bulgaria's innovation policy and monitor its progress. It will analyse the STI situation, allocate funds, review and adapt STI Policy and supervise the implementation of that policy. For the execution of the policy a non-political National Executive Body for STI is also planned to be established. It will act as the management bureau for the actions that are part of the STI Policy. It will finance them from the resources allocated by the National Council for STI, supervise their execution and evaluate their success and impact.

The implementation of the above-described STI Policy will cost about 630 MEuro for the period 2004 to 2013. This sum should be added to the current science and technology budget that is assumed to grow by 5% per year and it includes the cost of the adjustment of activities and structures. It is expected that the initiative will be covered 30% by the Bulgarian Government and an average GDP growth of 6% per year and an increase of the total R&D expenditures of the Government by 1.5. A sum of US\$ 439 million (US\$ 104 million for the period 2004-2007), has to be acquired as a loan from the World Bank and/or other financial institutions. Companies will cover the other part of the national R&D expenditures. Their share is expected to increase from 0,11% in 2002 to 0,29% of GDP in 2013. It is estimated that, if the initiative is implemented, the total Bulgarian R&D expenditure from 0,52% of GDP in 2002 will increase to 1,15% of GDP in 2013 (30% of the EU target 2010). This implies a significant increase of R&D expenditure from 67 M Euro for the period 2002-2013.

Table 3 summarizes major Government funded programmes which influence the improvement of interfaces in the innovation system. More details are available at <http://www.government.bg>.

**Table 4 - Major Government funded programmes and initiatives in favour of innovation**

Title	Government body responsible	Objectives of programme	Funding available (mention if co-financed by external donor)
Research plan of the Bulgarian Academy of Sciences	The institutes of the Bulgarian Academy of Sciences.	Improve quality of research results according to the plan.	State budget.
Research plan of technical universities	The technical universities	Improve quality of the education.	State budget.
National Council for Scientific Research at the Ministry of Education and Science.	Ministry of Education and Science	Financing of research activities and the implementing of scientific results. Implementation of the science policy and identification of priorities of fundamental and applying research.	State budget
SAPARD	Ministry of agriculture and forests	Innovation of agriculture and food industry.	30 – 50% of the funding is from the Bulgarian Government, the rest – EU.

#### Key findings

Numerous initiatives, mechanisms and programmes, incorporating innovation policy measures were prepared and carried out in Bulgaria. However due to insufficient funds, the end effect remains disappointing. The follow-up activities and functioning mechanisms introduced were hampered due to lack of resources. Budget allocation to technology development programmes remains inadequate reflecting poor awareness and low priority attributed by decision makers in the implementation of an innovation policy.

### 1.3 The innovation policy community

The innovation community in Bulgaria is relatively experienced, but is not sufficiently coordinated. The State is not effectively coordinating the various institutions, in order to contribute to a better innovation performance. The lack of resources, human, financial, organizational, is a barrier for the better functioning of the innovation community. The main actors (along with the business sector) in the Bulgarian innovation policy community are as follows:

- Parliament. There are several Commissions dealing implicitly with innovation policy matters through Laws and regulations: Economic Commission, Commission for Education, for Telecommunications, etc. However, none is explicitly responsible for the design of innovation policy;
- President. The Bulgarian President has an active role in science and education policy promotion;



- The Bulgarian Government is also playing important role on innovation policy matters. The most important Governmental institutions related to the innovation policy promotion, are as follows:
  - 1) Ministry of education and science; responsible for shaping up policies for the development of science and technology in the country.
  - 2) Ministry of economy; working in innovation strategy and policy implementation for business sector.
  - 3) Ministry of foreign affairs; activities connected with national R&D promotion.
  - 4) Ministry of regional development; promoting regional innovation plans.
  - 5) Ministry of labour and social policy; working in improvement of hi-tech employment.
  - 6) State agency for telecommunications; responsible for Bulgarian Information society strategy implementation.
  - 7) Agency for SMEs; plans and proposes policies towards increasing competitiveness and development of entrepreneurship also through innovation.
  - 8) Patent office of Bulgaria; provides information and support for patent applications.
  - 9) State agency for Standardisation and Methodology; develops new, harmonized with EU standards.
  - 10) National centre for information and documentation; provides sources for innovative ideas.
  - 11) National agency for education and training is actively involved in education policy formation.
  - 12) Commission for the protection of competition is responsible for competitive framework conditions, which favour innovation activities.
  - 13) Agency for foreign investment; involved in attraction of foreign technology investments.
  - 14) State agency for Bulgarians abroad; responsible for promoting information for investment opportunities for Bulgarians abroad.

Table 5 lists the main Government agencies and other organisations responsible for policy initiatives in the field of innovation.

**Table 5 - Government funded agencies**

Organisation	Status	Main responsibilities	Elements of assessment
Bulgarian Academy of Sciences	Non for profit organisation, existing under specific Law, 1991.	Managing research and technology development programmes.	The main research centre in Bulgaria. 1/3 of the state R&D expenditures in the country.
Technical universities	Non for profit organisations.	Managing research and technology development programmes.	6 science parks will be developed in 6 technical universities with PHARE support.
Ministry of Education and science	State/ public body.	Managing research and technology development programmes.	The very small budget is a constrain for more active state policy.
Agency for SMEs	Public body.	Specialised training seminars on how to establish a small company, company management, financial and market policy.	Proposes policies for increasing competitiveness and entrepreneurship through innovation.
Institute for Public Administration and European Integration	Public body.	From early 2001 for supporting the process of improving public administration and European integration activities.	Newly created <b>Institute</b> . Organises courses for officials, notably on improvement of services provided to enterprises.

**Box 1 - Recent debates in higher-education concerning the improvement of innovation support environment in Bulgaria**

1. **Discussions on the meeting for 24 May at the Bulgarian Academy of Sciences.** In his speech, the **President of Republic of Bulgaria** George Parvanov discussed a number of problems relating to S&T development in the country. Firstly, he pointed out that the research potential in Bulgaria is not enough involved in defining a strategy for a knowledge-based socio-economic development of the country. There is a lack of communication between state administration and research community and businesses have decreased their interest to fund R&D. Both factors have negatively affected the already low level of social support for the science and the support of the Parliament to allocate more funds for R&D. Universities allocate no more than 1% of their budgets for R&D.
2. In his speech on 21 May 2002, the **President of the Bulgarian Academy of Sciences Academician Ivan Yuhnovski** emphasised the recommendation of the Commission to Bulgaria to increase its R&D intensity. At the same time he pointed out that 20% of R&D expenditures of the Academy are coming from the European Union, but the results of the research are implemented in the EU, not in Bulgaria, due to the lack of a favourable environment for the exploitation of research results. He highlighted the Commission's recommendation to candidate counties to invest in their own research in line with the EU's decision 2010 to reach a 3% GERD/GDP by 2010.

“Innovation support providers” are the major organisations (private or publicly funded) which are active in delivering innovation support to businesses (e.g. higher education, science/technology parks or centres, etc.). Some more information on the scope of their activities (e.g. industrial R&D, training in innovation, etc.) is provided at table 6. The table also includes all Bulgarian stakeholders active in the field of innovation policy and their role in developing or implementing relevant policies (e.g.: employers federations, networks of organisations, chambers of commerce, etc.). Descriptions of partnerships or network type of initiatives between different organisations involved in the policy development are also given below.

**Table 6 - Main innovation support providers**

Organisation	Main type of service provided	Commentary
Ministry of Education and Science - National Science Council	Elaborates national priorities.	Plays important role in national innovation policy development.
Bulgarian Academy of Sciences	Managing and elaboration of research, Ph.D. education, contacts with universities and enterprises.	The biggest research state funded organisation. Member of a lot of networks, incl. EU.
IRC	As other EU IRC.	As other EU IRC.
ISPO	As other EU ISPO.	As other EU ISPO.
Business innovation centre – IZOT	Provides business infrastructure, consultations and education.	Private entity from 2001. Contacts with innovative firms.
Universities	Education, courses, consultancy.	The Bulgarian national education system includes curricula on “Entrepreneurship and the small business”. Some universities offer courses on Management of innovation techniques.
Ministry of Education and Science	Coordination of consortium between the Bulgarian Industrial Association and eight universities.	Partnerships between universities and enterprises exist in the form of a mutual participation in competitions.
Agency for SMEs	Developing national policy for SMEs, organising courses, etc.	Specialised training seminars have been organised by the Agency for SMEs and the Greek organisation for SMEs in: information management, sales management, management and participation in European programmes, marketing.
Bulgarian Industrial Association (BIA)	Elaborates industrial policy on behalf of its members. Provides education and technical support for regional structures.	Project “Initiative for assistance of just started entrepreneurs in favour of crafts and the middle class” has been successfully implemented by the Chamber of Skilled Crafts of Koblenz and the BIA with the participation of the Bulgarian Chamber of Skilled Crafts.
Bulgarian Chamber of Commerce and Industry	Elaborates policy in behalf of its members.	Organises basis courses on quality management (ISO 9000), taxation issues and structural funds.

Organisation	Main type of service provided	Commentary
Ministry of Education and Science - National Science Council	Elaborates national priorities.	Plays important role in national innovation policy development.
Institute for Public Administration and European Integration	Support for improving level of administration and European integration.	Carries out analysis and organizes courses.
Encouragement Bank.	Provides investment credits for SMEs for a period of four years and up to €200 000, and for export credits up to €500 000.	In 1999 the Encouragement Bank was created. The basic shareholder is the state % represented by the Ministry of Finance.
United Bulgarian Bank (UBB)	The amount of guarantee provided is respectively €5.5 million for credits to SMEs until 2004 and €5.5 million for credits for energy saving projects for the period until 2006.	A guarantee scheme of the United Bulgarian Bank (UBB) was launched in accordance with the American Agency for International Development (USAID).
Caresback Bulgaria Ltd,	Risk taking fund	Encourage entrepreneurship through long term financing to SMEs,
“ProCredit Bank”	For micro and small enterprises.	Set up by EBRD, Commerzbank AG, International Micro Investition AG, DEG - Deutsche Investitions - und Entwicklungsgesellschaft GmbH, and International Finance Corporation (20% stake each).
Fund “Agriculture”	Credits for private producers in the agriculture area and target financial lines, financial subsidies and preferential credit lines for producers.	The state funds “Agriculture”.
National Trust Ecofund	The National Trust Ecofund and the National Fund for Ecology provide grants and favourable conditioned loans for developing investment projects.	Oriented to cleaning polluted areas and ecology in general.
USAID, USTOI programme (Contact:, phone: +359.2.951.56.70; fax +359.2.951.50.70; Internet: <a href="http://www.usaid.net">http://www.usaid.net</a> ).	The USTOI programme is supported by USAID; Target: small and micro enterprises.	Assists trade and services to acquire access to financial services.
National Network for Micro Crediting	The National Network for micro crediting SMEs for production purposes.	It is supported by DSK Bank credits. Minimal own participation of 30%. Free expert assistance is provided for business plan development and credit argumentation.
Co-operation “Nachala”	To support the development of the smaller and family business through providing short-term loans for turnover resources and investment.	Co-operation “Nachala” is a partnership agency from the international network of the NGO Opportunity International.

Source: CC BEST, etc.

According to the Small and Medium-Sized Enterprises Act (SMEs Act)<sup>26</sup>, the Agency is responsible for the implementation and coordination of state policy in the sector (<http://www.asme.bg>). The agency supports “academic entrepreneurs”, and focuses on start-up technology-based SMEs creation and “spin-off” companies, particularly with the involvement of young researchers and doctoral students.

Banks are also another important group. Among them, Encouragement Bank offers credits granted for new technologies for the production of eco-products. Some other foreign or local financial institutions also provide **financing** (several tens of millions of Euros) these include: the micro-finance funds of the Soros Economic Development Fund and USAID; also the SME development funds such as those run by KfW (Germany), Eurobank, Unionbank, and United Bulgarian Bank or the credit lines provided by EU for export oriented and create new jobs in the areas of industry, transport, agricultural products and tourism.

#### Key findings

The innovation support system in Bulgaria is experienced but not sufficiently coordinated. The state is not effective enough in coordinating the different institutions contributing to innovation performance. The lack of resources – human, financial, organizational,- is a barrier for the better functioning of the innovation system. The funding programmes for business and public innovation policy development are insufficient and also poorly coordinated. As discussed in 1.2. the National Innovation Council can contribute to avoid these shortages of the Bulgarian innovation system.

### 1.4 Assessing innovation potential: data collection, surveys and indicators

Innovation potential is assessed on the base of existing data from National Statistical Institute (NSI) and other sources and from business point of view. R&D surveys are carried out in accordance with the OECD standards and classifications (Frascati manual) but NSI does not conduct innovation surveys.

#### 1.4.1 Innovation potential – statistical figures and comments

The research and development activities (R&D) in the country are analysed according to the following categories: status and dynamics of the scientific personnel; qualifications and age structure of scientists; R&D expenditure and intensity; personnel engaged in research and development activities; R&D results.

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<sup>26</sup> See: [http://www.asme.bg/en/legal/sme\\_law.htm](http://www.asme.bg/en/legal/sme_law.htm).

During the period 1995-2000 the number of scientists (employed persons with scientific title) decreased – they are 22 815 in 2000 and the decrease in comparison with 1995 is 10.8%. In 2000 more than half of the scientists – 51.6% possess scientific degree “Doctor” or “Doctor of science”, as their relative share increased by 1.9% in comparison with the preceding year and by 6.2% compared to 1995.

The distribution of scientists by field of science shows, that during the last years the largest part works in the field of social science and humanities and their relative share is 31.6% in 2000, which is 5.2% more than 1995. The number of scientists in the field of engineering and technology decreased during the last years (23.9% in 2000 compared to 1995), but as a relative share they continue to take second place (24.6%). An increasing age of scientists with higher level of scientific titles has also been observed. The share of professors over 60 years old is 63.7% out of all professors in 2000. It was 55.2% in 1995.

The predominant part (62.6%) of the scientific and technological personnel engaged in R&D is employed by the public sector. 15.2% of the employed persons in R&D work in the business sector, while the average level of this indicator in European Union is over 40%.

In addition, applied research constitutes over the half (51.4%) of all projects finished in 2000, followed by fundamental research (30.9%) and experimental research (17.7%). The relative share of completed R&D projects performed through international cooperation increased recently and it was 14.4% in 2000, in comparison to 10.5% in 1999.

#### **Collection of comparable to Eurostat requirements data and frequency.**

Categories of personnel in full-time equivalent (FTE): R&D expenditures by type of costs, by sources of funds – by institutional sectors, by type of activity, since 1995. This data is collected annually but they have not been published in the Statistical Yearbook yet.

**Table 7 - Annual data on Research and Development activities**

Purpose	To get information on the status of R&D activities – expenditures and personnel, in Bulgaria
<b>Definition of R&amp;D activities</b>	Each creative work, carried out systematically, aimed to develop knowledge, incl. knowledge for human being, culture and society, as well as the usage of this knowledge for new applications: <ul style="list-style-type: none"> <li>▪ Basic (fundamental) research - experimental or theoretical work intended for gaining new knowledge without concrete application and regardless its use;</li> <li>▪ Applied research – research aimed at gaining new knowledge but oriented to practical purposes, it distributes results into an executive form;</li> <li>▪ Experimental development – systemic work resulting from research aimed at production of new materials, goods, equipment, technology, prototypes etc.</li> </ul>
<b>Sector coverage</b>	<ul style="list-style-type: none"> <li>▪ Business enterprise sector: firms, organisations and institutions, whose main activity is focused on the production of goods and services for market in order to reach profit; profit R&amp;D institutions, non-profit institutions serving mainly the business enterprise sector belong here;</li> <li>▪ Government sector: institutions and bodies rendering public services which due to economic reasons cannot be rendered by other organisations and non-profit institutions administrated and financed mainly by the Government belong here;</li> <li>▪ Private non-profit sector: non-market, non-profit institutions and non-profit private persons belong here;</li> <li>▪ Higher education sector: universities and other organisations of the post secondary educational level regardless of their source of funds and legal status (including institutions administrated by universities or linked to them) belong here.</li> </ul>
<b>Reporting units</b>	All types of organisations are submitting the information on research and development: <ul style="list-style-type: none"> <li>▪ Enterprises, Firms, Research institutes, Academies, High schools, Other organisations with a separate balance sheet, which pay for R&amp;D to be carried out inside or outside of them.</li> </ul>
<b>Groups of questions</b>	<b>Description</b>
<b>Internal R&amp;D expenditures</b>	The indicator includes total expenditures on R&D activities within organisation: <ul style="list-style-type: none"> <li>▪ Current R&amp;D expenditures for basic research, applied research and experimental development;</li> <li>▪ R&amp;D expenditures for personnel; Expenditures for R&amp;D long term material assets, incl. machine equipment.</li> </ul>
<b>Sources of funds for R&amp;D</b>	Total R&D expenditures: <ul style="list-style-type: none"> <li>▪ Own economic activity, Budget, Enterprises, Universities, Foundations and associations;</li> <li>▪ International organisations.</li> </ul>
<b>Researchers</b>	This category includes employees who are considered as decisive for the creation and social utilisation of scientific knowledge. Of which with following levels of qualification: <ul style="list-style-type: none"> <li>▪ D.Sc. and Ph.D. degree; Bachelors and others with high education degree. Here project leaders, incl. heads of departments, sections, labs and other R&amp;D units; Ph.D. students.</li> </ul>
<b>Technical and equivalent personnel</b>	Technicians contributing to research projects by carrying out scientific and technological tasks under the control of researchers belong here.
<b>Supporting staff</b>	Qualified craftsmen, secretaries and other employees participating in works on R&D projects. This category includes other managers and administrative staff dealing with personal and financial issues whose activities are considered as direct service for research.

Purpose	To get information on the status of R&D activities – expenditures and personnel, in Bulgaria
<b>R&amp;D personnel scope of R&amp;D activity</b>	<p>According to the time involvement:</p> <ul style="list-style-type: none"> <li>Up to 49%,</li> <li>-50-89%,</li> <li>-90% and more.</li> </ul>
<b>R&amp;D personnel by field of science</b>	<ul style="list-style-type: none"> <li>Natural (mathematics, mechanics, etc.),</li> <li>Technical (machine building, energetic, etc.),</li> <li>Medicine (pharmacy, etc),</li> <li>Agricultural sciences (agronomy, etc.),</li> <li>Social sciences (philosophy, economics, management, etc),</li> <li>Total number.</li> </ul>
<b>R&amp;D personnel by level of occupation</b>	<ul style="list-style-type: none"> <li>Academicians, Active members, Professors, Senior research fellows – 1st degree, Docents, Senior research fellows 2nd degree, Senior lecturers and lecturers, Assistants, Research fellows, Total, incl. D.Sc. and Ph.D.</li> </ul>
<b>R&amp;D personnel by gender</b>	<ul style="list-style-type: none"> <li>Male,</li> <li>Female.</li> </ul>
<b>Human resources (Labour market survey)</b>	<ul style="list-style-type: none"> <li>Graduates post - secondary technical and art schools ( ISCED classes 5a – education in universities and equivalent institutions, which leads to acquirement of a qualification degree “bachelor” and “Master”, 5b – tertiary education in colleges, which leads to acquirement of a qualification degree “Specialist”, 6 – doctorate or second stage of tertiary education, which leads to acquirement of a qualification and scientific degree “Doctor”) by field of education data by years, from 1995 (incl. Post-secondary technical and art schools total and by field of education: arts, humanities, business and administration, computing, technics, manufacturing and processing, architecture and building, veterinary, personal services, transport services, environmental protection, security services, not known and unspecified). Data 1995–now. It is possible to calculate the percent of S&amp;T graduates among all post secondary graduates.</li> <li>Employed and unemployed labour force by level of education. It is possible to calculate the percent of working age population with a tertiary education.</li> <li>Employed (average annual number) by economic activity groupings and sector. It is possible to calculate the percent of total employment in medium-high and high tech manufacturing.(NACE chemicals - 24, office equipment - 30, electrical equipment - 31, telecom equipment -32, precision instruments - 33, automobiles - 34, aerospace and other transport - 35).</li> <li>Employed (average annual number) by economic activity groupings and sector. It is possible to calculate the percent of total employment in high tech services.(NACE telecommunications – 64, information technology, incl. Software development – 72, R&amp;D services - 73).</li> </ul>
<b>R&amp;D expenditures by type</b>	<p>Total expenditures of the organisation, incl. Expenditures for:</p> <ul style="list-style-type: none"> <li>Long term assets,</li> <li>Other,</li> </ul> <p>Current expenditures:</p> <ul style="list-style-type: none"> <li>Labour costs,</li> <li>Other.</li> </ul>



### Collection of comparable to CIS methodology data and frequency

There is no survey organised by the National statistical institute but several surveys have been undertaken by academic groups. The main results of analyses are published in Bulgarian and some of them in English.

**Table 8 - Inventory of surveys undertaken by research groups**

Surveys	1994-1995	1996	1997	2000	1999	2001
<i>Surveyed period</i>	<i>1989-1995 (1980-1995)</i>	<i>1996</i>	<i>1995-1997</i>	<i>1997-2000</i>	<i>1999</i>	
<b>Main purpose</b>	To study the directions of technology change in Bulgaria	Foreign investment as a channel for technology transfer	Barriers to innovation	National Innovation policy	Market for innovation in information technology	National innovation policy
<b>Methodology</b>	Developed by the author in the framework of a BAS project	Developed by an international team (Bulgaria and The Netherlands)	OECD Oslo manual	OECD Oslo manual	OECD Oslo manual	OECD Oslo manual (CIS- II)
<b>Number of surveyed enterprises</b>	20	50	112	83	42	57

A survey of 59 enterprises was provided in Lovetch, Montana, Pleven, and Veliko Turnovo regions in 1998. It was based on developed by BAS methodology using OECD Oslo criteria. A survey of 72 firms from the computer sector was carried out in Bulgaria in 2001 using developed methodology based on Oslo criteria and another one in 2002, covering 57 firms of different branches (some results were presented in section1.1).

#### 1.4.2 Assessment of innovation potential in Bulgaria: business point of view

A very important characteristic of innovation in Bulgaria is the business point of view on innovation potential and environment. The following statements are the result of a representative survey of 230 firms and were presented in the report “Competitiveness of the Bulgarian economy”<sup>27</sup>.

Bulgarian businesses highly appreciate research, engineering and technical personnel in the country as an important prerequisite for technology development. However, 76% of the firms pointed out that there is a continuing tendency of these specialists seek jobs abroad.

<sup>27</sup> <http://www.ced.bg>

**The Government policy to promote companies R&D is considered unsatisfactory. More than half of the participants in the survey emphasize the fact that there are no direct Government subsidies or tax credits for research activities.**

Entrepreneurs think Bulgaria continues to lag behind in technology development and the Government policy to promote R&D in companies is considered unsatisfactory. More than half of the participants in the survey emphasize the fact that there are no direct Government subsidies or tax credits for research activities. Government procurement does not influence enough the development of innovation processes either, since most contracting decisions are based on price, rather than technology. Businesses also do not appreciate R&D cooperation with universities for the launching of new products. Only 5% of the surveys assess this process as intense and continuous.

Over 70% of the sample companies responded that entrepreneurs with innovative and risky projects can not raise venture capital to finance them, a fact that proves the existing limited access of Bulgarian companies to venture capital.

According to 57% of the respondents, Government services are not provided via the Internet and most entrepreneurs think that the laws pertaining to information technologies, (e.g. e-business, e-signature) and consumer protection do not function efficiently.

Public access to the Internet is relatively limited according to 44% of the respondents and it is mainly available through libraries, Internet centres and clubs. However, access to Internet in schools is considerably more limited according to 65% of the respondents.

### **1.4.3 Innovative potential of “dynamic” and “academic” SME’s**

In 2000, a survey<sup>28</sup> showed that 51.5% of the Bulgarian “dynamic SMEs” are production companies, 70% of them undertake trading activities and they are located mainly in the capital city and the main regional centres.

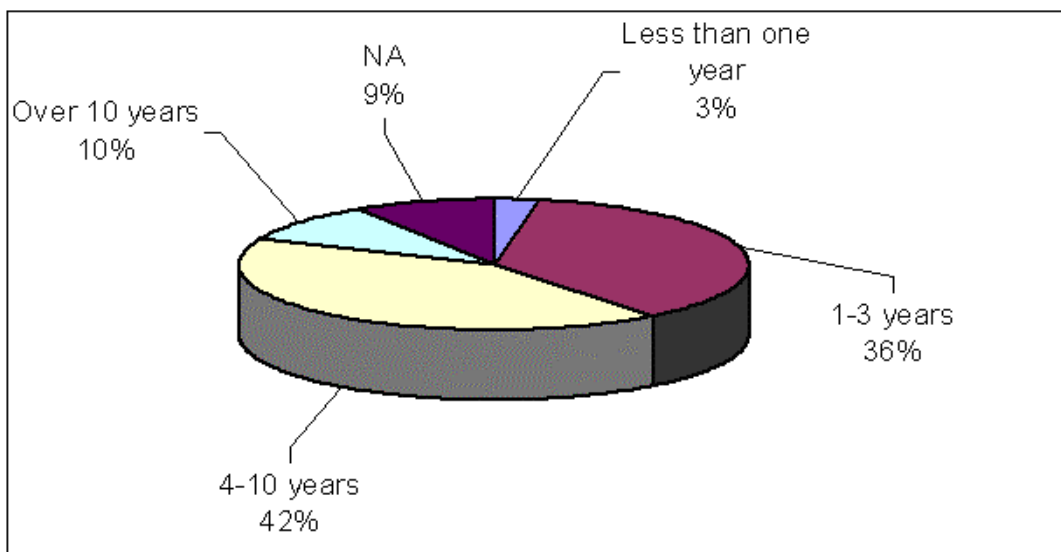
The average age of Bulgarian “dynamic SMEs” is six years and ten months. This means that they possess sustainable competitive advantages, which have enabled them to survive and maintain growth for a relatively long period of time.

The age of the equipment that most “dynamic SMEs” (42%) use is between 4 and 10 years old. (figure 2). In addition, when starting their business, “dynamic entrepreneurs” most often use personal savings (77.3% of the cases), borrowings from friends and relatives (39.2%) and bank loans (24.7%). The financial profile of the “dynamic” start-up SMEs is similar to that of the sector in general. However, when the “dynamic SMEs” improve their market position, the use of bank loans grows to 31.37%.

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<sup>28</sup> The survey is carried out under the project “Dynamic entrepreneurs: comparative study of Bulgaria and Poland” (Centre for Entrepreneurship Development and University of National and World Economy, 1999 - 2000).

**Figure 1 - Average age of equipment**



*Source: The Project “Dynamic entrepreneurs: comparative study of Bulgaria and Poland”, Centre for Entrepreneurship Development & University of National and World Economy, 1999-2000.*

The most serious problems perceived by dynamic entrepreneurs are weak internal demand and strong international competition, as well as the low provision of loans, the high level of taxes and the collection of debts/receivables.

Main barriers to innovation for new, competitive products are, first, the lack of financing (61.8%), the inappropriate production equipment (23.7%) and the lack of knowledge about new technologies (21.1%).

In recent years, a new group of entrepreneurs – the so-called “**academic entrepreneurs**” - has appeared in both the industrially developed countries and in Bulgaria, recently. These are researchers and academics from national research institutions and universities, who start their own businesses. In 1999 and 2000, increasingly greater attention was being devoted to entrepreneurship encouragement through the educational system, but not a lot of reliable data exist on the creation of academic start-ups or spin-off companies.

#### **Key findings**

- In respect to the innovation data collection in Bulgaria there is fully harmonized to the Frascati/EUROSTAT requirements on R&D data available since 1990/3. The National Statistical Institute has not undertaken any innovation survey, but some academic institutions undertake comparable to CIS I and II surveys.
- The innovation potential in Bulgaria is based mainly on its human resources. In recent years academic spin-off companies have started to be created. However, the financial environment does not yet support risky ventures and the use of venture capital funds.

## 1.5 Legal and administrative environment for innovation

The overall legal and administrative environment for innovation has been improved during last years through specific measures and laws.

### 1.5.1 Legal environment

The legal environment for innovation is defined by the all functioning laws and acts, which concern economic activity in the country. However, there are very limited specialised legislative measures in favour of innovation.

**Table 9 - Legislative measures in favour of innovation**

Title of legislative acts or regulations	Date of adoption and application	Specific measures in favour of innovation	Comments
National strategy for high-tech development in Bulgaria	1999	Law on high-tech parks prepared.	Under discussion in the Parliament. It will help to improve the framework conditions for innovation.
Strategy for Information society development	1999	National programme for information society development Law on electronic signature.	It will help to improve the framework conditions for innovation.
Law on electronic signature	2001	Creates infrastructure for innovation activities.	Influence indirectly business to be engaged in innovation.
National strategy for SMEs development	2001	To promote new technology start-ups.	It could have large influence on academic spin-offs creation.

The harmonization of the Bulgarian legal with that of the EU is a precondition for developing a favourable environment for innovation.

According to the Commission's 2002 Progress Report on Accession for Bulgaria, the legal framework for innovation activities has been further aligned. But Company law still needs to be brought fully into with elements of the 'acquis', especially on acquisition, mergers and division of companies.

There have been further improvements in protecting intellectual and industrial property rights (IRP), but further steps need to be taken to ensure that it is widely applied and that legal personnel is trained to handle IRP matters. Bulgaria also co-operates with the World Intellectual Property Organisation (WIPO) to modernise the intellectual property system in order to increasing the

competitiveness of local SMEs, industry, R&D and other organisations. The aims of this cooperation is the increased awareness of entrepreneurs on the intellectual property system and that the number of patents used in production increases.

Important progress has been made with the entry into force of State Aid Law on anti-trust, where Bulgarian legislation is largely in line with the 'acquis'.

### 1.5.2 Specific measures undertaken to alleviate the administrative burden<sup>29</sup>

In 2000, the Government undertook a detailed review of the existing licensing, permit and registration arrangements. By December 2000, a total of 121 regulations had been revoked or alleviated.

New regulations were adopted providing for improvements in the administrative servicing for entrepreneurs in specifically defined areas. For example, the new Settlement of Territory Act (in force from March 2001) introduces a requirement for a formal coordination and provides for tacit agreement in some clearly specified cases, in particular when coordinating technical and detailed investment projects. The introduction of the principle of tacit agreement, represents a step forward and reflects a current trend in the Bulgarian legislation.

Alleviation of the administrative burden for entrepreneurs was achieved also through **amendments to the regulatory framework**, which governs export trade arrangements. Following the Council of Ministers' Decree 233/08.11.2000 on export trade, a **new regime** was introduced from the beginning of 2001 for obtaining the necessary permits and registration for export transactions. Under the new arrangements, the competent Government institution prepares the permits and registrations and the papers are formally communicated to the Ministry of Economy. Under the previous administrative framework, the entrepreneurs themselves had to ensure coordination with the competent institutions and after that to handle file applications for permits and registrations, through the Ministry of Economy.

The **Administrative Servicing of Physical and Legal Persons Act** (State Gazette 95/2.11.1999) adopted at the end of 1999 is also important. The Act stipulates that administrative servicing should be based on the principles of lawfulness, promptness, accessibility, and that the administrative servicing be raised up to

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<sup>29</sup> See also the CC-BEST report and the directory of measures compiled for Bulgaria notably those relating to improving the visibility of support services; and the public administration.  
[http://europa.eu.int/comm/enterprise/enterprise\\_policy/enlargement/cc-best\\_directory/index.htm](http://europa.eu.int/comm/enterprise/enterprise_policy/enlargement/cc-best_directory/index.htm)

the highest quality standards and as convenient as possible for individuals and the individuals and organizations involved. The Act provides also for administrative penalties for those civil servants, who violate its provisions. It should be mentioned, however, that Act **is not well known** and is **not always applied**. It is also important when the act is **applied on a subsidiary basis**, i.e. where there are no special regulations governing the administrative servicing in a particular area.

In 2000 in line with the provisions of the Administrative Servicing of Physical and Legal Persons Act, specific steps were taken in some of the District Governments (pilot project in the Districts of Sofia Capital, Sofia Region, Blagoevgrad, Pazardjik, Smolyan, Veliko Tarnovo) for the organisation of **“one-stop-shops”** within the respective local authority. The same “one-stop-shop” principle is also applied for in many municipalities such as Assenovgrad, Blagoevgrad, Vidin, Gabrovo, Rousse, Svishtov, Silistra, Sliven, Stara Zagora, Haskovo, etc.

New legislation has also been adopted concerning the access of SMEs to public orders. In April 2000, an Ordinance for the award of small-scale public orders (orders below the thresholds defined Article 7, paragraph 1 of the Public Orders Act) was passed. The Ordinance stipulates that upon launching a tender for the award of small-scale public when, the tenderer shall include conditions to ensure and encourage the participation of SMEs. Also applicable to the small-scale public orders is the rule provided through in the Public Orders Act. Through that, for the evaluation of the proposals of the tenderers, among other conditions, priority should be given to those which are SMEs or which have SMEs participating as sub-contractors.

### 1.5.3 Corporate taxation policy

The Government's tax policy in 2000-2001 is in compliance with the overall policy objective of improving the business environment in the country. One of the tax policy instruments for the period 2000-2001 was the **phased reduction of the tax burden**, through amendments in tax legislation. These are:

**Corporate Income Tax Act.** In 2000, profit tax for companies with taxable profit exceeding 50000 BGN was reduced by 2% compared to the 1999 figure. The process of reducing profit tax continued further in 2001, with amendments to the Corporate Income Tax Act. The following reductions in the tax burden were introduced:

- The average tax rate was reduced from 25% to 20%;
- The tax rate applicable to enterprises, whose annual taxable profit does not exceed 50000 BGN, was reduced from 20% to 15%.

***Social Insurance Policy.*** The Mandatory Social Insurance Code (MSIC) came into force at the beginning of 2000 starting the practical reform of the Bulgarian Pension Insurance System. One of the important amendments to the Code, which concerns small and medium enterprises, is the reduction of the insurance burden of employers.

The above measures in the area of corporate taxation policy lead to an improvement of the innovation environment but have not affected innovation performance due to the insufficient financing system.

#### **Key findings**

- In Bulgaria some positive legislative changes have taken place since 1998. They do not aim at developing framework conditions for innovation, but they support the improvements in environments for competition favour innovation in the country. Steps and initiatives - to improve visibility of services and public administration, etc. to simplify the administrative procedures for creation of companies.
- There are no Government measures aimed at providing tax incentives to companies as a mean of stimulating industrial R&D or innovation activities.

## **Section 2 - Measures to improve the environment for innovation**

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During the 1990s Bulgaria had to manage two types of transition: the transformation from a socialist into a democratic society with a market economy, and to follow the changing techno-economic paradigm internationally. The latter faces certain types of transition due to main challenges of contemporary development, including: the shift of technological paradigm to high technologies; the changing structure of national innovation systems (collaborative networks, organisational changes, etc.); the shifts in socio-economic paradigms (restructuring of employment, new types of skilled workers, new forms of inequality, rise of technologically oriented service sectors, etc.); globalisation.

Training and education play a very important role for this transition. In essence, innovation is understood as the ability to manage knowledge creation in response to market articulated demands and other social needs. Innovation performance in enterprises depends on incentives provided by the economic and regulatory environment, their access to critical sources (via factor markets or through interactions in networks and clusters of knowledge-based organisations) and their internal culture to use own capacity to seize market and technological opportunities.

### **2.1 Teaching and training initiatives in favour of an innovation and enterprise culture**

The major problem in respect to teaching and training activities, which are in favour of an innovation and enterprise culture in Bulgaria, is the very low level demand for such initiatives.

#### **2.1.1 Trends for supply of skilled human resources**

Even after a decade of transition, there remain sustainable conditions and advantages for human resource development in the hi-tech field in Bulgaria. The level of education in mathematics and hard sciences is at a high level, as results of international competitions among pupils illustrate. According to a paper of the World Economic Forum, the level in Bulgaria in this area is better than in countries like USA, the UK and other more advanced economies.



The results of teaching and training initiatives in the country show<sup>30</sup> that Bulgaria is trend leader for population with tertiary education in respect to all candidate countries. As was mentioned in Section 1.1, new science and engineering graduates account for 4.75% of the 20-29 year old population. It puts the country on the second place after Latvia in the group of CC7.

As also mentioned in 1.1.2, the percentage of working age population (25-64) with a tertiary education in Bulgaria is 21.29, where as the EU average is 21.22. The country is trend leader among the CC13 in this respect as well. In addition 5.50% of total employment is in medium-high and hi-tech manufacturing and the percentage of total employment in hi-tech services (NACC 64, 72-73) is 2.71, where as the EU average level is 3.61.

However, the supply of HE and skilled personnel for hi-tech manufacturing and services in the country is higher, then its demand.

A comparative analysis of the quantitative changes in the numbers of R&D people employed has shown that, recently, Bulgaria has approached the average of the EU and is leaving behind some other former socialist countries from Central Europe. Bulgaria has 7.3 R&D personnel per 1000 labour force (1996), where as the average for the EU is 9.5 in 1997<sup>31</sup>.

The number of publications as a result of scientific research is an indicator of the national potential for fundamental research in the relative of science fields. The specialisation of Bulgaria in basic science, according to the number of publications, is continuing to be in the so-called 'hard sciences': chemistry, physics, and mathematics, as in other former socialist countries.

Practical applications of Bulgarian fundamental research are mainly in the fields of biology and engineering, and also in science for Earth and Space, mathematics, and chemistry.

Business R&D in Bulgaria has declined more than 2.5 times over the last 5 years. Public sector accounts for the major share of R&D funding. NGO sector has a strong potential, but it is not enough well developed while higher education has traditionally weak presentation in funding R&D.

***The specialisation of Bulgarian skilled human resources in fundamental science:***

- ***Chemistry,***
- ***Physics,***
- ***Mathematics.***

***The specialisation of the R&D personnel in applied scientific research is in:***

- ***Biology and engineering;***
- ***Science for the Earth and Space, mathematics, and chemistry.***

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<sup>30</sup> European Commission, European Innovation Scoreboard 2002, Cordis focus, <http://www.cordis.lu>

<sup>31</sup> Towards a European research area. S&T and Innovation Key figures, European Commission, 2000.

A very important characteristic of the supply side of the innovation market in Bulgaria is the number of registered Bulgarian patents in the country and abroad during the recent very difficult years. The largest number of registered patents are in the area of pills and medicaments, pesticides, herbicides, and other compound micro-organisms and ferments, medicine, veterinary science and hygiene, main electric elements, techniques and cable connections, etc. These are areas where it may be assumed Bulgaria has some solid basis to develop further innovation processes and products.

Another indicator, illustrating the trends on human resources supply is the number of graduate students by years.

**Table 10 - Bulgarian graduated students**

	1998/99	1999/00	2000/01	2001/02
<b>Students</b>	41579	44501	46319	47128
<b>From universities and specialised institutes</b>	35073	36484	41216	42374
<b>Colleges</b>	6506	8017	5103	4754

*Source: NSI, 2002.*

The total numbers of graduates is increasing, thus showing a positive trend in the area of supply of skilled human resources in Bulgaria. Another example is number of PhD students in the country.

**Table 11 - Bulgarian students in advanced research (Ph.D.) programmes**

	1995	1996	1997	1998	1999	2000	2001
<b>Students</b>	1305	1744	2283	2496	2787	3069	3585
<b>Of which: regular training</b>	437	599	926	1031	1240	1480	1794
<b>Graduates with degree</b>	154	229	246	285	326	375	340
<b>Of which: after regular training</b>	46	61	54	69	85	94	102

*Source: Statistical Yearbook 2000, NSI, Sofia, 2001, NSI, 2002.*

**Demand and supply for skilled human resources in Bulgaria indicate opposite different trends.**

Demand and supply for skilled human resources in Bulgarian economy indicate opposite trends. Over the last decade the total number of R&D personnel in Bulgaria has declined about six times. This implies that the human potential, able to be involved in R&D activities has seriously declined during the decade. As mentioned before, the decline of business R&D activities was sharper.

### Structure of demand for R&D personnel by field of science.

The structure of demand for skilled human resources by field of science – scientists - persons who have been awarded a scientific title (academician, corresponding member, professor, associate professor, associate researcher, lecturer, assistant) in the business sector is presented in the table 11 below.

**Table 12 - Scientists by field of science in business sector as of 31 December 1999**

Field of science and specialties	Number of scientists in business enterprises
<b>Total</b>	<b>910</b>
Natural sciences	107
Of which:	
Chemistry	40
Engineering and technology	694
Of which:	
Electronics	95
Communication technics	84
Electrotechnics	39
Automation and data processing	48
Chemical technology	158
Transport	57
Medical sciences	64
Of which:	
Pharmacy	55
Agricultural sciences	24
Social sciences and humanities	21
Of which:	
Economics	21

Source: NSI

The total number of scientists in the business sector as of 31.12.1999 is 910. Most of them are skilled in engineering and mainly chemical technology, electronics and communications, as well as mechanical engineering. 107 are involved in natural sciences (40 of them are from chemistry), 64 in medical sciences and 24 in agrarian sciences.

### 2.1.2 Education initiatives in favour of an innovation and enterprise culture

In 1999 and 2000, more attention has been devoted to entrepreneurship encouragement through the educational system.

Entrepreneurship training programmes in professional schools of economics have changed rapidly and radically. Twenty percent of all students (132,244 students) have been trained in those schools – polytechnic and vocational high schools. Training programmes for entrepreneurship will be developed and introduced in non-economics vocational schools in grade 13.

***Partnerships between Bulgarian and foreign universities are a very important component of entrepreneurial training.***

Partnerships between Bulgarian and foreign universities are a very important component of entrepreneurial training. Primary projects were implemented under the Tempus and PHARE Programmes. Departments delivering training in entrepreneurship were set up within Bulgarian universities. It has been more than six years since the establishment of an advisory network by the Bulgarian Industrial Association and the university centres in Rousse, Svishtov, Varna and Sofia: Training and Business Advice Centre (the University of Rousse), International SME Centre (D. A. Tsenov Business Academy, Svishtov); University SME Advisory Centre (the Technical University of Sofia), International Centre for Small and Medium-Sized Businesses (University of Economics, Varna), Consultancy Centre (Institute for Postgraduate Training to the University of National and World Economy, Sofia) etc.

An example of cooperation between industry and universities, is the consortium between the Bulgarian Industrial Association and 8 Bulgarian universities<sup>32</sup>, which has now been operating for five years. The consortium activities seek to achieve higher competitiveness for companies and maintain this competitiveness in a dynamically developing economic environment, as well as to increase staff competitiveness and skills through continued training in compliance with the requirements of international markets and consumer demands.

The transition period has affected significantly the vocational and educational training (VET) system in Bulgaria in order to meet the new challenges for economic and social development of the country and to meet requirements for improving innovation and enterprise culture. The structure of the VET system is summarised in the box below.

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<sup>32</sup> Angel Kanchev University of Rousse, Technical University of Gabrovo, Higher Education Institute of Food Industry – Plovdiv, University of Plovdiv, Technical University of Varna, University of Economics – Varna, University of Burgas.

### Box 2 – VET system in Bulgaria

#### 1. VET Institutions

##### 1.1 Government institutions

National Agency for VET (NAVET)

<http://www.navet.government.bg>

Ministry of Education and Science (MES) <http://www.minedu.government.bg/>

Ministry of Labour and Social Policy (MLSP) <http://www.mlsp.government.bg/>

##### 1.2 Social Partners - national represented organizations of Employers and Employees.

Bulgarian Industrial Association - strategy, mission, policies, priorities in VET.

##### 1.3 Training Institutions

#### 2. Types of professional qualifications

**Initial qualification** within the system of education. Orders for acquisition and verification are regulated with Public education act, Law for level of education, educational minimum and training plan, Higher education law and Law for VET.

**Initial and additional qualification for working adults** (over 16 years old) . Orders for acquisition and verification are regulated with Vocational Education and Training Act (VETA), Law of unemployment protection and employment incentives, Labour Code, etc.

In conclusion, there is a well developed legislative framework for the development of teaching and training initiatives in favour of innovation and enterprise culture in the country. However, the main barrier is the lack of the relevant demand.

### 2.1.3 Institutional framework for teaching and training initiatives in favour of an innovation and enterprise culture in Bulgaria

Bulgaria is developing its institutional framework for teaching and training initiatives in favour of innovation and enterprise culture. There are several institutions, which are involved in this framework.

The National agency for vocational and educational training (NAVET) is a body created by the Council of Ministers which is responsible for the national system of VET in accordance with the legislative framework (especially VET law). NAVET creates mechanisms for quality management of institutions providing VET. The main activities of NAVET contribute to improving innovation performance of the country through: a) Development and adaptation of governmental educational requirements for acquiring professional qualifications; b) Development and approval of procedures and documentation for accreditation of institutions and professions; c) Accreditation of institutions and professions within the VET system; d) Development of a monitoring system for accredited and licensed institutions; e) Improvement of license-system for VET centres and centres for information and professional orientation.

The Ministry of Education and Science (MES) is pursuing specific policies in the area of vocational education and training to enhance the quality of labour. Adopts state educational requirements. Provides conditions helping the vocational education and training system in meeting state educational requirements. Analyses vocational education and training outcomes and efficiency. Endorses the List of vocations to be covered by vocational education and training, etc. The Education Inspectorates (EI) as the regional MES structures implement governmental policy in the area of VET following the principle of decentralization.

The Ministry for labour and social policy (**MLSP**) co-ordinates and implements policies aiming at protecting unemployed people and stimulating employment of unemployed people. It also seeks to promote vocational training of employed and unemployed people as well as to protect the interests of the national labour market.

The **Bulgarian industrial association** (BIA) actively participates in the decision making process and has developed a strategy on VET; in line with its mission to protect the interests of its members. Its efforts are guided towards the elaboration of appropriate tools for development of entrepreneurship and increasing the competitiveness of its members. BIA prepares legislative proposals for the creation of a well functioning labour market in terms of quantity, quality and labour cost. From this point of view the functions of BIA in the VET system are quite important and they are directly connected with the increase of competitiveness of enterprises through the functioning of a high-quality workforce.

**Box 3 - Bulgarian Industrial Association's policy objective on  
Vocation education and training**

- Participation in the process of developing an optimum legal framework, of creating organisational and financial conditions to establish a working VET system at a national level;
- Assistance in the process of criteria establishment and quality assurance in the sphere of employment, as well as in the process of creating a mobile work force that will be able to adapt to a free market competitive environment;
- Sustaining the level of training so that it would comply with labour market demands. This is the most significant requirement for getting and keeping one's job, as well as for pursuing a successful career;
- Offering all aspects of vocational training – initial vocational training, additional training and retraining;
- Offering of consultation services – career guidance, consultation and guidance;
- Organisation of special training for acquisition of professional qualifications for a specific job offered by an employer, as well as training courses aimed at the enhancement, further accumulation and extension of professional knowledge acquired earlier on.

BIA's priorities are:

- To co-operate actively with managers of firms, especially with the managers of SME, on the need for and the result of investment in personnel training;
- To create traditions and skills in the firms for the assessment of training needs;
- To offer significant and decision-oriented products;
- To discover market niches for new activities in management training;
- Preparation of marketable products, which satisfy existing needs;
- Application of new educational forms, such as distant learning and the Internet as a new educational technology;
- Effective usage of international programs and projects in VET – multinational, bilateral, regional, etc.

**Key findings**

Bulgaria has a well developed institutional framework for teaching and training initiatives, which are in favour of innovation and enterprise culture. But, as it was stated before, the insufficient financial and incompatible skill resources are still an obstacle.

**2.1.4 Training and education institutions in Bulgaria  
in favour of innovation and enterprise culture**

There are 49 separate higher education organizations in Bulgaria (seven private universities) and eight independent colleges (private entities).

**The Innovative Activities in the Bulgarian Higher Schools.**

Until 1990 in all higher schools of the country, the so-called research and development sectors (RDSs) were in operation. Usually the RDSs were managed by the Vice-rector of the schools and had their own structures and activities. Together with the broad activities that were carried out many of the RDSs deployed heavy and expensive structures which had a negative effect on the

***Restructuring of R&D activities is being undertaken with the majority of the scientific research being redirected from the fundamental to the applied science areas.***

costs of their innovative products. In the beginning of the 90s RDSs in all higher schools were shut down. On one hand this led to a tangible reduction of the innovative activities in higher schools and on other hand – caused serious tension among the majority of their personnel. A part of the personnel promptly left the schools, others established private companies that formally were under the guidance of the schools and only a small part managed to redirect itself to exclusively teaching activity.

The scientific research and innovative activities in higher schools gradually took their natural place as an integral part of the educational process directly linked to the qualification of the lecturing staff and the training of the students and the Ph.D. students. Along with that, a restructuring of R&D activities is being undertaken with the majority of the scientific research being redirected from the fundamental to the applied science areas.

The large Bulgarian universities have a developed structures, highly qualified personnel and a large part of the necessary technical equipment. The scientific teams of the majority of the higher schools participated in the Fifth General Program of the European Union for Scientific Research and Technological Development or in the programmes Socrates 2, TEMPUS, the scientific program of NATO, in bilateral and multilateral programs in the science and applied science areas. The joint work of higher schools with other scientific and development organizations on issues of national importance is rapidly expanding.

The formula “small enterprise + scientific team = innovative market product” is increasingly being applied in the co-operation between higher schools and the country’s small and middle sized businesses. There are many examples of commercial collaboration between the private business and scientists and lecturers from the higher schools. Below are presented only a few examples:

- “MARVEL” Ltd, Sofia – Technical University, Sofia - production for the local market and for export of lathes with DPC on the base of conventional machines;
- “Spesima” JSC, Sofia - Technical University, Sofia - production of robots and manipulators for export;
- “Siemens” Ltd, Sofia - Technical University, Sofia - production of terminal equipment for integrated services communication networks;
- “KAMBANA 1899” Ltd, Burgas – Higher Institute of food and tobacco industries - filter technology with uninterrupted operation for manufacturing of high quality vegetable oil;
- SP “M-engineering”, Vratza – University of chemical technology and metallurgy, Sofia - technology for production of plant protection chemicals with sulphuric active elements and others.



### **Bulgarian Academy of Sciences<sup>33</sup> in favour of innovation.**

After 1990 significant changes have occurred in the personnel structure of the Bulgarian Academy of Science (BAS). The employed staff in all units decreased by 43.8% in 2001 as compared to 1990 (from 14 821 to 8 370 persons). During the same period the number of scientists decreased by 27.8% (from 5 032 to 3 635 persons) and the number of specialists with higher education decreased by 34.2% (from 3 335 to 2 196 persons). The number of workers shows the greatest reduction – by 81.2% (from 2 765 to 521 persons), which proves that the capabilities of BAS to put into practice the developments of scientists and experts in the academy itself have been considerably limited. At the same time the number of scientists with academic rank increased by 6% (from 1 753 to 1 859 persons), the number of senior research assistants (I degree) by 3% (from 309 to 318 persons) and the number of senior research assistants (II degree) by 16% (from 1 242 to 1 441 persons). The number of academics increased by 1% per cent (from 11 to 12 persons) but the number of the member-correspondents has decreased from 31 to 28 persons. There has been a significant reduction in the number of professors by 61.3% (from 124 to 48 persons) and in the number of the associate professors by 64.7% (from 34 to 12 persons) and also in the number of the scientists with academic rank by 46% (from 3 286 to 1 776 persons). It is difficult to draw fundamental conclusions on the base of these data but the fact that emerges is that the personnel base for scientific growth in BAS (scientists without academic rank and specialists with higher education) is considerably narrowed.

The age structure of BAS has worsened noticeably during the last 7-8 years. The average age of the scientists at the end of 2001 is 49.7 years, at the end of 2000 it was 49.3 years, in 1999 - 47.9 years, in 1997 - 47.5 years and in 1996 - 46.6 years. The relative share of the scientists in the higher age groups increases compared to the previous years, while the share of the scientists aged under 45 is decreasing. At the end of 2001 the share of the scientists aged over 45 years was 66.53% of all scientific staff but at the end of 1993 that share was 54.3% which means an increase of 12.2%. This phenomenon has become a permanent tendency - during the year 2000 these scientists have formed 63.95% of all scientific staff, in 1999 - 61.34%, in 1998 - 58.4% and in 1997 - 57.5%. This trend is particularly noticeable in some of the scientific units – “Physical sciences” - 74.2%, “Social sciences” - 69.2% “Technical sciences” - 67.2%, while in BAS as a whole the average relative share of the scientists aged over 45 years is 66.53%. Very close to that level are the units “Humanitarian sciences” - 65.4% and “Biological sciences” - 64.8%. “The youngest” scientists are in the department “Mathematical sciences” where the scientists aged over 45 years are 62.4% and in the “Chemical sciences” - 62.8%.

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<sup>33</sup> Annual Reports, BAS, 1996-2001.

At the same time the number of the scientists under 35 years of age is very low particularly in some of the units, for example, in “Humanitarian sciences” their relative share is only 1.2%, in “Physical sciences” - 3.7%, in “Social sciences” - 5.4% and so on. The relative share of this age group is higher in the units “Technical sciences” - 13.3.% and in “Chemical sciences” - 12.5%.

If this trend is retained during the following years, BAS will be endangered by a serious “aging” of its scientific potential. Moreover the precise analysis shows that the great reduction of the scientific potential during the last 11 years is at the expense of the younger scientists and specialists. Nevertheless, BAS remains the main research institution in the country.

**The role of BAS in specialist training.** The Educational Centre (EC) created in 1997 supervises and co-ordinates the BAS activities for training of highly qualified personnel – doctorals and post-graduate students.

In 1998 the structure of the Centre was outlined and the Regulation of its activities approved. Since its creation, the Educational Centre has organized the training of the doctorals and post-graduate students and carried out various activities some of them with international participation.

After all that has been said about the age structure of BAS, the increase of the doctoral students in 2001 compared to the previous years brings a certain amount of optimism. There has been a 179% increase during the period 1996 to 2001 – from 412 persons in 1996 up to 737 persons as at 31 December 2001. These figures include the regular doctoral students whose numbers have increased during the same period from 139 up to 424 (+305%) and the extramural doctoral students – with an increase from 28 up to 191 (+ 682%). There has been a considerable decrease in the number of self-dependent doctorals - from 245 down to 122 (- 49.8%).

It is difficult to assess whether the fact that only 4,0-4,5% of all doctoral students in BAS have defended their doctors degree during the years 2000 and 2001 is a good indicator. Based on the available information the state of the doctorate studies in BAS during the last 2-3 years can be put into words by the following sentence: many enlisted – many struck off – few successfully defended.

The BAS scientists participate actively in the specialist schooling irrespective of the certain decline in their participation in the training of students in higher schools in comparison to the previous two years. There is also reduction in the number of graduating students in the higher schools with scientific directors from BAS. The Academy keeps the tradition to be host of dozens of schools (56 during the year 2001), most of which are with foreign participation (56 during the year 2001).

**Box 4 - Ministry of economy measures to improve the environment for human resources for enterprises**

The Bulgarian Dream project of the Ministry of economy and the workforce agencies Job Tiger and Top Team have co-organized a forum entitled “Careers 2002” on 21-22 of May, 2002, at the Interped World Trade Center in Sofia. The forum united efforts in discovering new possibilities for career orientation to young people in Bulgaria. The forum was aimed at assisting university graduates in their searches for a suitable career start, and employers – in recruiting the necessary staff. Assessment: The new point of this year’s meeting is that, it has been attended by representatives from the state administration as well – Ministry of finance, Directorate of Taxes, and Ministry of Economy and that there was established an electronic data base for students. Not as many firms attended as expected. See <http://www.jobtiger.bg/carriers/2002/>.

The Ministry of economy has opened a new section “Intellectual market”. The object is to facilitate the contacts among inventors, producers and investors to combine their efforts towards products and technology improvement. Assessment: the project it is on an early stage. Only one meeting has took place. The major problems identified were the lack of funding for those kinds of activities.

**Table 13 - Organisations involved in human resource development for innovation – examples of initiatives for implementation of innovation related training programmes**

Higher or other education organisation	Main type of innovation related training or advisory services	Commentary
University for national and world economy, Sofia University, Ministry of economy, JP Morgan, Deloitte&Touche, EBRD, Lazard, Goldman Sachs, Baden Wuerttemberg Bank.	Initiative “Bulgarian dream”: Bulgarian students in the country and abroad at the end of their BA or MA education to be funded for a short term work or specialisation in leading companies in the country and abroad.	The initiative is aimed to allow young economists at the end of their education in Bulgarian university to improve their skills in well known western economic organisations. See: <a href="http://www.mi.government.bg/about/links.html">http://www.mi.government.bg/about/links.html</a>
Economic Faculty at the University of Forestry in Sofia, New Bulgarian university – MA programme for telecommunications, University for national and world economy, Sofia.	Combined engineering and business programmes (B.A. and M.A. levels).	Efforts made to re-design courses in partnership with industry.
University of Forestry in Sofia, New Bulgarian university.	Innovation management courses (BA and MA level).	Faculties promote programmes.
Universities, firms, etc. in the Bulgarian Association for Management and entrepreneurship.	Actions to promote an entrepreneurship spirit in schools.	Organisation of networks between members and offering training courses.
Private schools for marketing and management.	“The Business Planning Game” and other similar games.	Involvement of orientation of young people in the modern business world. See: <a href="http://www.emc-cup.de">http://www.emc-cup.de</a>

**Table 14 - Some initiatives for human resource development in Bulgaria**

Organisations responsible	Objectives	Funding
1. Universities, private industry, state bodies, NGOs.	Establishment of regional centre for education in hi-tech in BG and South-Eastern Europe (SEE).  Tasks: training, technology transfer, building infrastructure, elaboration and marketing for e-learning.	Stability pact ( <a href="http://www.stabilitypact.org">http://www.stabilitypact.org</a> ), European Commission, World bank, Bulgarian Government, Universities, private sector.
2. Universities, industry, SMEs, state institutions, owners of risk capital, NGO in South-Eastern Europe.	Attracting direct investments in universities and other academic institutions and establishment of sustainable partnership in BG and SEE “University – Industry – Government”.  Tasks: establishment of sustainable partnership between firms, organisation of investment forum, attracting foreign and local investments, training, transfer of technologies, development of the infrastructure, development and marketing of services (training, e-learning, consultation, e-commerce, etc.).	Private sector, Risk capital, Stability pact, European Commission, Bulgarian Government, Universities.
3. Universities, Industry, state institutions, NGO.	Development of contemporary methods, instruments and services for human resource development on the base of ICT in BG and SEE.  Tasks: training, technology transfer, infrastructure development, development and marketing of services for e-learning.	European Commission, Universities, private sector, Bulgarian Government, Stability pact, World bank.
4. Bulgarian and foreign universities, SMEs and big enterprises, state institutions, owners of risk capital, NGOs.	Development of capacity of Bulgaria for international cooperation for human resource development for innovation and technological development.  Tasks: Improving information, training and permanent support for Bulgarian organisations for international cooperation, mainly in the frame of European programmes.	European Commission, World bank, private sector, risk capital, Stability pact, Bulgarian Government, Universities.
5. Universities, SMEs.	Organisation of short term specialisations in European SMEs and Universities.  Tasks: education and mobility of researchers, technicians and managers in European SMEs and universities up to 6 months to minimize “brain drain” process.	EC, SMEs, Universities.

### Key findings and policy implications

The low level of financial resources and the low level of demand for innovation in the country defines relative unwillingness of Bulgarian investors and entrepreneurs to expose themselves to risk. However, some initiatives and efforts have been taken to promote entrepreneurship and innovation through the education and training system. However, brain drain from the higher education remains a serious problem.

Accordingly, the following policy implications can be identified:

- The state has to continue to combine its efforts with international resources for vocational training and skills development;
- Current training and educational programmes have to be developed in order to respond to specific gaps and weaknesses. The state in cooperation with EU has to contribute to: a) improvement of demand for innovation activities; b) development of mobility schemes from research to industry and from industry to research, as well as for international mobility schemes in further education courses; c) development of training of trainers in innovation-oriented courses; d) development of innovative material for innovative courses.

## 2.2 Initiative in favour of the uptake of information and communication technologies in enterprises

### 2.2.1 ICT business in Bulgarian economy

The development of information and communication technologies plays a significant role in the development of infrastructure supporting modern innovation activities.

ICT expenditures in the country were 3.8% of GDP in 2001, which is lower than the EU-average of 6.93%. The share of manufacturing value added in high-tech sectors in the country is 5.9 for 2000. It is lower than EU average of 10.1.

The level of ICT business development is lower comparing to the EU average. It is also lower relating to the high level of supply of well skilled and educated ICT specialists in the country. This situation results in significant brain drain process.

There are some positive developments in the sector, but they are insufficient.

During the last three years and especially in 2000 the ICT sector contributed to a significant increase of the gross output of the “Communications” sector - by 32.3% compared to 1999. Organisations from both public and private sector have contributed to the gross output increase. In absolute terms, the increase of the gross output in the private sector was three times higher than in public sector. The relative share of the private sector in gross output increased by 12.0 points in comparison with

1999 and reached 45.6%. The development of new private enterprises and the supply of new services for business are the main factors for that increase.

Computer access is one of the main indicators for assessing the penetration of Information Technologies in Bulgaria<sup>34</sup>. The level of IT penetration in Bulgarians' everyday life can be evaluated as relatively low. As of May 2002 the approximate number of PC users aged 18 and over were about 886,000<sup>35</sup> (13.8% of the adult population). The socio-demographic structure of people with computer access features several specific characteristics:

- People with higher education are the largest share of those having computer access –49%. in May 2002;
- The highest level of PC usage is observed among the 18-40 age group;
- Whereas in 2000 there were practically no gender differences in terms of computer access, in May 2002 the share of women with computer access was nearly 5% higher than that of men;
- Computer access is concentrated in larger cities and mainly in Sofia.

Bulgarian Internet users typically access the virtual space for three main purposes:

- First, as a source of information. The leading motive of a considerable part of Internet users is the search for various types of information (inquiries, news, current events, and others);
- Second, for entertainment purposes. An increasing part of Internet users consider it a media of fun and entertainment (chats, discussion forums, games, and other forms of entertainment). The virtual space offers extensive possibilities for diverse activities. They are popular, user-friendly, and last but not least, relatively cheap;
- Third, for business and education purposes.

Financial transactions operations and online shopping are still used rarely. The main reasons for this are the reliability of the connection, the low level of awareness of these technologies and the low level of trust in electronic banking (only three of the commercial banks - United Bulgarian Bank, First Investment Bank, and Union Bank – provide e-services).

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<sup>34</sup> Vitosha Research, <http://www.online.bg/vr.surveyeng/eread>

<sup>35</sup>[1] This estimate is based on the data from the population census (March 2001), according to which the total population aged over 18 numbered 6,417,869, and 1% of the sample represents 64,180 people.

### 2.2.2 Development of information society policy

By Decree No.40 of 1998, the Council of Ministers established the Coordination Council on Information Society Issues. Its basic function is “to develop and submit for approval by the Council of Ministers the strategy and the national programme for the Information Society development in the Republic of Bulgaria”.

The **Strategy for Information Society development in the Republic of Bulgaria** (see section 1.2) defines the national priorities for transition to IS at legislative, technological, economical and social levels and outlines the basic related activities. The target is to develop an information society that would be more democratic, more accountable and more inclusive. The emerging knowledge-based economy in the transition or former transition economies could be a driving force for rapid economic developments that would speed up the catch-up process. A major task for the Governments, business and NGOs is emerging: to prevent a digital divide. Commitments based on shared responsibilities to work in partnership in this area are of key importance.

Nevertheless, the key objective is not commitment but action that would mainstream ICT into work aimed at achieving the ICT goals: reducing development disparities among regional economies, promoting prosperity by giving new opportunities to young generation and women and underdeveloped –often rural – areas.

It is primarily a responsibility of Governments to develop e-strategies and to implement them. However, the preparation and far more efficient implementation of the national e-strategies require a close cooperation of all stakeholders – Government, private sector and civil society. As the importance of civil society in developing, IS is so far less understood in Bulgaria, it is a must to underline their role in ensuring that some fundamental principles are put into practice like securing access to information and knowledge, promoting diversity and cultural identity, building IS at the community level, developing human capacity through education, training and skills development, is indispensable.

Some of the initiatives aimed at improving the level of diffusion and uptake of ICTs in the economy are summarised in the table below.



**Table 15 - Initiatives taken in favour of the uptake of ICTs - summary**

Organisations responsible	Objectives	Funding
Ministry of education and science	1) Improving education in IT National strategy for education in ICT. (1998). Programme (1999) in order to improve the level of education in ICT. Order of 30.08.1999 to include informatics and IT as two obligatory for all pupils. The education started on 1 <sup>st</sup> of Sept., 1999. In May, 2000 all requirements to the teaching programmes have been published.	EC, PHARE, national sources.
Committee for posts and communications (1999)	2) National strategy for Information society development. Objectives: open IC infrastructure; implementation of new ICT in management, economy, education, culture and healthcare, national security and ecology; development of ICT sector as a leading sector in Bulgarian economy; improving quality of ICT human resources.	Government and other sources to be identified.
Ministry for economy, 1999	3) National strategy for hi-tech development in Bulgaria. Tasks: to develop dynamic hi-tech sector, which will improve the competitiveness of Bulgarian economy.	Government, private business, FDI, international programmes.
Ministry of economy, 1999	4) Project for a Law for hi-tech parks and hi-tech activities.	Government, private business, FDI, international programmes.
Universities, Industry, state institutions, NGO, 2001	5) Project: Development of contemporary methods, instruments and services for human resource development on the base of ICT in BG and SEE. Tasks: training, technology transfer, infrastructure development, development and marketing of services for e-learning.	European Commission, Universities, private sector, Bulgarian Government, Stability pact, World bank.
Faculty for communication equipment and technologies at the Technical university in Sofia, 2002	6) Investing in education of the future personnel Funding of R&D projects.	Bulgarian Telecommunication company, ERICSON, Siemens, Mobitel, Electronic progress, Union for electronics, electrotechnics and communications, Kontrax, Teko.

Source: <http://www.government.bg> and consulted experts.

Especially the fifth initiative is aimed at:

- Establishing a critical mass of experts, able to apply modern e-learning technologies in education;
- Establishing a virtual centre for cooperation in ICT and business education between Bulgarian universities and firms in the form of “MEGAUNIVERSITY”;
- Establishing communication platform for e-learning, incl. Interactive TV for the SEE region;

- Development of a national learning portal for educational and training programmes, products and services and for connections with SEE;
- Development of a Bulgarian industry for e-learning as a strategic direction of the new economy development.

The sixth initiative is aimed at involvement of firms in decisions for ICT research and education.

#### Key findings

- The level of IT penetration in everyday life is relatively low. Computer access is concentrated in the bigger cities and mainly in Sofia. However, a significant increase in the total turnover of the private sector involved in ICT took place during the last 3 years.
- Bulgarian Internet users typically access the virtual space for three main purposes: first, as a source of information; second, for entertainment purposes; third, for business and education purposes.
- Financial transactions operations and online shopping are still used rarely. The main reasons for this are the reliability of the connection, the low level of awareness of these technologies and the low level of trust in electronic banking (only three of the commercial banks – United Bulgarian Bank, First Investment Bank, and Union Bank – provide e-services).

### 2.2.3 Potential to uptake ICT in enterprises and initiatives for its improvement

A large number of scientists in the business sector are skilled in electronics and communications, as well as mechanical engineering. This implies serious positive shifts of the Human Resources available and market orientations towards this sector. The measures of the Ministry of Education and Science to improve human resources in IT sector include:

- National strategy for education in ICT (1998);
- Programme (1999) in order to improve the level of education in ICT;
- Order of 30 August 1999 to include informatics and IT as obligatory for all pupils and was applied on 1<sup>st</sup> Sept 1999. In May 2000, requirements for the teaching programmes have been published.

***The specific Bulgarian tradition of favouring education is a factor, which affects the human resources development in ICT sector.***

One of the main factors affecting the supply of human resources for technological development in the country is the extremely **high interest of young people in education in ICT**. The reasons are: a) Bulgarian tradition of favouring education; b) the fast developing IT markets in EU and USA; c) and, Bulgarian experts have a good combination of skills in both hardware and software.

### **Box 5 - Strong demand for ITC related degrees**

Young people, who apply to study at the Technical university - Sofia prefer on the first place: Computer systems and technologies –3836 of applicants; Communication equipment and technologies –1784 of applicants. There are between 12 and 530 applications for the remaining 32 specialties. The minimum scores from the exams for the first two specialties are 19.85 and 19.60 (where the maximum scores are 21).

Foreign demand for Bulgarian skilled human resources in ICT sector has led to a serious brain drain for the country. For the last 10 years 300,000 IT specialists have left the country, according to the National Statistical Institute. The reasons for that are: The low level of market demand in the country; the higher level of demand in EU – 0.8 million. (1.7 million. in 2003), and in USA (1.6 million); weak practical knowledge of young people to develop own business in the country; weak collaboration between universities, research institutes, and business.

Education in and use of ICT, as well as development of the National network for education and science are among the main tasks of the National Strategy for Information Society development and the initiative eEurope+. The plan for 2005 intends that every pupil in secondary school to possess “electronic literacy”, and all schools, universities and institutes to have access to the internet.

For the period 2002-2003, for both educational program and network development program, a budget of between €25 and €45 million (minimum and optimum) is required.

The period 2003 - 2005 requires between €29 million (minimum) and €44 million (optimum - including replacement of depreciated computers in the schools).

### **Key findings and policy implications:**

Bulgaria is characterised by a good level of supply of skilled personnel in ICT. But the demand in the sector is not sufficient which leads to brain drain phenomena.

The state is mainly responsible for meeting the schools demand for new ICT implementation. But there is a tendency that the state funding for National network for education and science will decrease.

There are a lot of initiatives in favour of integrating ICT in enterprises in order to extend and speed up the diffusion and pace of technology, information and knowledge. But they are not effectively implemented. Among the main reasons are the lack of financial resources and limited demand.

Bulgaria has to develop its potential as a regional education and training centre in the area of ICT, using both: local and foreign sources.

## Section 3 - Business innovation interfaces and support measures

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### 3.1 Research community – industry co-operation

***The "European paradox" of high quality research capacity and weak innovation in the EU, takes even more place in Bulgaria.***

The "European paradox" of high quality research capacity and weak innovation in the EU, exists in Bulgaria. This paradox in Bulgaria is defined by several specific factors, among which are the volume and structure of foreign trade in the country for the last decades. The Bulgarian innovation system has been the most negatively affected by the collapse of former COMECON as it was predominantly specialised in producing hi-tech export products and services. In addition, the wars in former Yugoslavia were a major barrier for the faster economic integration within Western European market.

An important indicator for effectiveness of research community – industry cooperation is the availability of innovation plans. According to a Survey<sup>36</sup> the majority of Bulgarian entrepreneurs in the studied three clusters (food processing, textile and canning) have innovation plans for the next three years. Their distribution is as follows: 64% of the textile and clothing firms from the Region of Russe have such plans; 74% of the canning firms from the Region of Plovdiv have innovations plans and 50% of the wood processing and furniture firms from the Region of Mesta expressed intentions to introduce innovations in their activities.

Another indicator for increased research – industry cooperation is connected with intellectual property rights. During the year 2001 the **Patent Bureau** at the Executive board of BAS has intensified its activity regarding IPR issues relating to the research work of the scientists in the Bulgarian Academy of Sciences units and has extended its work related to 2002 the invitation of the Republic of Bulgaria for full membership in the European Patent Organization. There is a certain increase in the number of the IPR submissions compared to the previous periods but still this is not a sign of a noticeable change.

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<sup>36</sup> FED, Report on the results of a survey carried out in the framework of VICLI / CADSES project, 2001.

According to unofficial data 22% of the submitted applications during the year 2001 belong to the Bulgarian Academy of Sciences or by virtue to BAS employees. The financial security of the research activities can not secure IRP protection of scientific research. In the case of joint research efforts, the partners are given the right to utilise the IPR results based on contractual agreements. The patent bureau provides consultations for the formulation of such agreements.

There is a significant shift in the nature of the linkages between firms and research base during the transition<sup>37</sup>. These institutional changes have negatively affected knowledge transfer. As a result the position of the country in respect to the technology transfer index <sup>38</sup> is very low comparing to other transition economies countries and some neighbouring countries: Poland is 6<sup>th</sup>, Hungary is 8<sup>th</sup>, Turkey is 15<sup>th</sup>, Czech Republic is 24<sup>th</sup>, Greece is 32<sup>nd</sup>, Slovakia is 37<sup>th</sup>, *Bulgaria is 56<sup>th</sup>*.

**Table 16 - Forms and activities for research – business cooperation**

Coordinating structures	Examples and activities
Ministry of economy	Provides information for: European market for technologies, Technologies for IRC in Europe and the country, Technology transfer and partnership.
Research centres interfaces	<b>Bulgarian Academy of Sciences</b> - Deals with manufacturing, trading and other activities, related to scientific experiments and application of scientific results.
Intermediate structures to ease access to R&D sources for companies - science and technology parks	<b>Technical university in Sofia</b> -Projects with firms, international projects. ▪ <b>University of forestry</b> - Projects with firms, for educational purposes, international projects.
Cooperative research programs co-financed by public funding	The former structural fund at the Ministry of education and science, now – a part of the directorate at the same Ministry provides support for industry-research cooperation.
Committees with industrial participation	BIA, BAMPE –aim: to evaluate and decide on financing of public R&D programmes.
Award schemes for industry-research collaboration	Plovdiv fair, and more specifically – with cooperation with the Union of Scientists in Bulgaria.

<sup>37</sup> Chobanova R., Tunzelmann, 2002 Innovation in Bulgaria during transition, mimeo.

<sup>38</sup> Source: The Global Competitiveness Report 2000, World Economic Forum; CED (2001, figure 2, p. 9).

Only the last two forms are solely privately funded. All other forms are public/private funding.

The Ministry of economy develops several activities<sup>39</sup> to promote business innovation interfaces. It provides updated information on for European market for technologies, based on CORDIS. It links its site with the IRC network and provides information for technologies offered and requested from the European market, and for technologies offered and requested from Bulgaria.

Alongside formal links the role of informal interactions increasing in the country. The reasons are that the country is small and that the representatives of the business and research community are integrated in different alliances for exchange of information and experience. Those, who are in businesses or Government, from one side, and those, who are in University laboratories and Academy on the other. For example the Union of scientists in Bulgaria (among 5 000 members in the country). Federation of the Scientific-Technical Unions, etc.

### **3.2 Support for start-ups and new technology based firms**

In its report of 9<sup>th</sup> October, 2002, the European Commission has mentioned that in Bulgaria; ‘Good progress has been made in structural reforms, especially as regards procedures for market entry, the restructuring of financial sector and privatisation, thus setting the microeconomic basis for a progress of sustainable growth’.

New-firm creation, and more particularly the creation of firms with an advanced technological base (NTBF) and openness to global markets, are particularly important factors in the restructuring the economy.

The political changes in the 90s allowed start-ups to flourish in the country. Recently a process of improving the conditions for new firm creation, and particularly for hi-tech ones taking place.

NTBF, are supported through amendments to the Law on Standardisation, which removes conflicts of interest between standardisation and regulatory functions and/or certification.’ Considerable efforts are still needed to reinforce administrative procedures for standardisation and certification and to create systems for national conformity assessment and market surveillance (notably laboratory upgrading and accreditation). Company law has also been further aligned but still needs to be brought fully into line with elements of the ‘acquis’, especially on acquisitions, mergers and divisions of companies.

***By adopting several instruments such as National strategy for hi-tech development in Bulgaria, and the Updated Strategy for development in Bulgaria the Government stimulates the creation of new firms, and particularly high-tech ones.***

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<sup>39</sup> <http://www.mi.government.bg>

Several instruments have been taken by the Government for stimulating the creation of new firms, and particularly high-tech ones<sup>40</sup>. However, the lack of policy tradition in this area creates difficulties for the creation of an adequate portfolio of measures.

The **National strategy for hi-tech development** adopted by the Government in 1999 aims at increasing the role of hi-tech in contemporary economy at improving the conditions for development of hi-tech activities in the country.

The current policy is based on the implementation this document including actions for improving the business climate in the country, developing industrial zones, plans for innovation strategy, etc.

Some further initiatives, connected to start-ups and NTBF support are described in the following tables:

**Table 17 - Main initiatives taken in favour of start-ups**

Organisations responsible	Objectives	Target public	Funding
Encouragement bank.	Increasing the competitiveness of the Bulgarian production; Support of any investment; Export. Long-term investment funding; (e.g. venture capital funds, management support schemes, incubators).	For new technologies or technology lines, for the production of eco-products. An type of SMEs and NTBFs.	The credits are granted in term of 4 to 10 years. The minimum amount for any credit is €20,000 and the maximum is €1,000,000 provided that the personal contribution is 25% of the credit value; provides refinancing under this programme, of up to 50% of the value of the funded investment project.
Agreement for financial collaboration between Republic of Bulgaria and Federal Republic of Germany.  ▪ KfW, Evrobank and Unionbank.	“Promotion of SMEs in the Country”.  ▪ Credits to micro and small enterprises.  ▪ Micro-crediting.	Any SMEs  Micro and small enterprises  Micro and small enterprises	German credit institution KfW provides a credit line amounting to €5million KfW, Evrobank and Unionbank (€4.25 million). Soros Economic Development Fund - New York.

<sup>40</sup> See: National strategy for hi-tech development in Bulgaria, Updated Strategy for Information society development in Bulgaria, etc, <http://www.mi.government.bg>.

Organisations responsible	Objectives	Target public	Funding
“Microfond Smolyan, Sliven and Kardjali” financed by the: micro-crediting; Bulgaria/CRS/USAID.	Programme for micro financing Credit line co-funded by the EU	Small and family companies working in the field of commerce, services and production in the regions of Pleven, Stara Zagora and Nova Zagora.	Bulgaria/CRS/USAID EU/BG
A credit line co-funded by the EU is opened to SMEs.		SMEs, which are export oriented and create new jobs in the areas of industry, transport, agricultural products and tourism.	
<i>Bulgarian Industrial Association</i>	“Initiative for assistance of just started entrepreneurs in favour of crafts and the middle class”.	Just started entrepreneurs in favour of crafts and the middle class.	Chamber of Skilled Crafts of Koblenz and the Bulgarian Industrial Association with the participation of the Bulgarian Chamber of Skilled Crafts.

**Table 18 - Additional Initiatives taken in favour of start-ups promotion and entrepreneurship**

The Bulgarian Chamber of Commerce and Industry	Award for investing in new technologies, organisation of courses on quality management (ISO 9000), taxation issues and structural funds.	State bodies, central institutions, local and regional institutions, NGOs and international organisations, sponsor special <b>entrepreneurship courses</b> .
Institute for Public Administration and European Integration	Courses for officials, notably on improvement of services provided to enterprises.	
Agency for SMEs	Courses, information and consultations, networking	Special accent on academic and technology based start –ups.
Bulgarian Industrial Association, (Contact: Mr. Branimir Handjiev, Director General, see details above).	The “ <b>National Contest for the most successful Entrepreneur</b> ”.	It was organised in 2001 by the Bank DSK and the Bulgarian Industrial Association.
Encouragement Bank	The Bank provides investment credits for improving the business of SMEs for a period of four years	In 1999 the <b>Encouragement Bank</b> was created. The basic shareholder is the state% represented by the Ministry of Finance.
United Bulgarian Bank (UBB).	The amount of guarantee provided is respectively €5.5 million for credits to SMEs until 2004 and €5.5 million for credits for energy saving projects for the period until 2006.	A <b>guarantee scheme</b> launched in accordance with the American Agency for International Development (USAID).



Caresback Bulgaria Ltd,	<b>Caresback Bulgaria</b> Ltd encourages entrepreneurship through long term financing	It is a risk fund.
“ProCredit Bank”.	For micro and small enterprises	set up by EBRD, Commerzbank AG, International Micro Investitionen AG, DEG – Deutsche Investitions - und Entwicklungsgesellschaft mbH, and International Finance Corporation.
State Fund “Agriculture”	The state funds “ <b>Agriculture</b> ” provides target financial lines, financial subsidies and preferential credit lines for producers.	<b>credits</b> projects for private producers in the agriculture area.
National Trust Ecofund	The National Trust <b>Ecofund</b> and the <b>National Fund for Ecology</b> provide grants and favourable conditioned loans for developing investment projects.	Projects to be oriented to cleaning polluted areas and ecology in general.
USAID, <b>USTOI</b> programme	The <b>USTOI</b> programme, supported by USAID, assists small and micro enterprises.	Projects in trade and services to acquire access to financial services.
National Network for Micro Crediting	The <b>National Network for micro crediting</b> supported by DSK Bank credits SMEs for production purposes with a minimal own participation of 30%.	Free expert assistance is provided for business plan development and credit argumentation.
Co-operation “Nachala”	Its main goal is to support the development of the smaller and family business through providing short-term loans for turnover resources and investment.	Co-operation “Nachala” is a partnership agency from the international network of the NGO Opportunity International.

*Source: CCE BEST report.*

### 3.3 Business networks for innovation

Changes in the organization of the social and economic life in Bulgaria after the 90's have opened new opportunities for developing existing or creating new business networks in the country and abroad. The rapid development of new technologies changes the nature of competition and highlights the importance of business networks for innovation. Current understanding of innovation processes in firms points to the importance of business-to-business interactions.

A precondition for developing business networks is the legal and administrative system. As has been outlined in section 1.5 above, there have been some significant improvements in that respect since 1999. The initiatives mentioned in the following table are some of the activities taken in favour of inter-firm cooperation and networking.

**Table 19 - Some initiatives taken in favour of inter-firm co-operation**

<b>Organisations responsible (initiator and management structure if different)</b>	<b>Objectives (e.g. clusters, joint R&amp;D, product development, sub-contracting consortiums, etc.)</b>	<b>Target public (e.g. specific sectors, suppliers of multinational companies, etc.)</b>	<b>Funding (level of funding, source: public/private)</b>
Ministry of economy	Provides information for: European market for technologies; Technologies offered and requested by IRCs in Europe and the country; Technology transfer and partnership.	Innovative firms	Public/private
Bulgarian association for information technologies	Clusters, joint R&D, product development, sub-contracting consortiums (fairs).	Specific sectors	Private
Bulgarian Association of regional development agencies and business centres (BARDA)	Development of contacts, exchange of information etc. on regional level.	Regions	Private / public
Federation of the Scientific-Technical Unions in Bulgaria	Clusters, joint R&D, product development, sub-contracting consortiums, etc.	Sectors, represented in different independent unions, which belong to the federation.	Own, in cooperation with other public and private funds.
Bulgarian industrial association	Clusters, joint R&D, product development, sub-contracting consortiums, international cooperation, etc.	Industrial firms, which belong to the BIA	Own, in cooperation with other public and private funds.
BIZ-ISOT	Joint R&D, product development.	SMEs, which take part.	Own, with cooperation with other private entities.
Bulgarian Chamber of Commerce and Industry	Inter-firm cooperation in industry and commerce.	members	Own, with cooperation with other sources.
Bulgarian association for information technologies	Inter-firm cooperation.	Members	Own, with cooperation.
All different professional unions, like Union of Bulgarian architects, developing chamber of architects, etc.	Development of contacts, exchange of information etc.	R&D personnel, working in the business sector.	Own, private.
Innovation relay centre	Clusters, joint R&D, product development, sub-contracting consortiums, etc.	EU and national R&D personnel, working in the business sector.	EU, own, private, public.
Agency for foreign investment in Bulgaria	Development of contacts, exchange of information etc.	Business circles abroad and in the country.	State, EU.

There are many organisations whose mission corresponds to the business networking for innovation, but the intensity and the scope of their activities are insufficient.

One of the most influential businesses networking organisations is the Bulgarian chamber of commerce (<http://www.bcci.bg>). It contributes through several services and information, that facilitate business relations in Bulgaria.

Concerning business networking in ICT one of the most influential organisations is the Bulgarian Association of Information Technologies (BAIT, <http://www.bait.bg>). BAIT was established in 1995, and up date has 138 company members. Most of them are leading companies the areas of hardware, software, telecommunications and Internet. Its' mission is to define and defend the common interests of its members, by establishing information technologies as a priority in the development of the national economy. BAIT is an active partner of the Government and legislative organs in forming the state policy in the field of information technologies and in building a strategy for e-Government. The Association has a recognized authority in the country, as well as internationally. BAIT is a member of the World Alliance of Information Technologies and Services and works actively on European Union projects such as the Information Society Initiative for South-Eastern Europe (ISIS). BAIT also organizes the two biggest annual high-tech exhibitions in Bulgaria - BAIT EXPO, and BAIT Internet EXPO & Telecomex, at the end of April.

#### **Key findings**

- The recent level of activities of the business networks for innovation in the country is insufficient.
- There are several networks developed for inter-firm cooperation in Bulgaria. But the intensity and efficacy of their interaction depends on intensity of demand (with a big influence of the foreign demand) for the output of the participants, which is on the low level of performance.

## Section 4 - Conclusions and Policy opinions

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### 4.1 Key conclusions Bulgaria

The stable macroeconomic environment in Bulgaria in the period from 1997, when the currency board was implemented, onwards provided a solid foundation for an active innovation policy. Several policy documents concerning innovation policy were set up and related programmes were launched. However, their implementation is poor and lags behind the proclaimed policy maintaining insufficient innovativeness in Bulgarian economy.

The low level of R&D intensity, and especially that of the business sector is a barrier to an active innovation policy in the country. The limitations for the establishment of state funds (which follow the IMF requirements) is a barrier in organising R&D funding. That is why decisions are directed towards the institutional funding and the establishment of an Innovation fund, where the state has a limited participation (See: Innovation: Strategy and implementation project – <http://www.mi.government.bg>).

Business R&D performance in Bulgaria is insufficient. Banks remain the major source of long-term financing for enterprises since capital market, which could provide funds for long-term financing is underdeveloped. Most banks rely on traditional banking services, while more sophisticated products and services (e.g. investment banking) lag behind. Venture capital funds are only in their infancy. A positive sign is the increased number of leasing contacts in 2002.

Cooperation between industry and research community has been a subject of serious criticism in the Bulgarian R&D policy. A number of evaluators – domestic and foreign, have identified a serious lack of links between the two communities as a key deficiency, pointing out the fact that while the total amount of public funding of R&D is not critical, the actual impact of public R&D on the technological development in industry is poor.

Numerous initiatives, mechanisms and programmes were prepared and carried out in Bulgaria, but due to insufficient funds, end effect remains disappointing. The follow-up activities and functioning mechanisms introduced were hampered due to lack of resources. Budget allocation to technology development programmes remains inadequate reflecting poor awareness and low priority attributed by decision makers in the implementation of innovation policy.

#### **4.1.1 Overall evaluation of framework conditions for business innovation intensity in Bulgaria**

Following the conclusions in the previous sections the level of policy maturity of Bulgaria would be defined as one on level of development of explicit innovation policy (grades 2 +, if the grades are as follows: 1. Absent (innovation not recognised as policy issue; 2. Infancy – development of policy ; 3. unstable (competing policies, regular changes to policy; 4. mature = policy framework in place for at least 2 years). The lack of coordination between different initiatives is a barrier for a mature policy, in spite of the coordination between two main ministries.

Policy delivery would be defined as on level of projects (2 + grade if the grades mean: 1 No implementation; 2 projects or infrastructure initiatives; 3 ad hoc implementation of support schemes (budget limits); 4 multi-annual programmes operating 2 years and more). The effectiveness of policy delivery is not enough successful.

There is no relationship between maturity and delivery (no correlation) of innovation during the transition period. It is defined mainly by lack of funding for implementation of policy measures.

Innovation constituency (stakeholders) is characterised by limitation of their number and narrow range of functions, based on the small client base. It would be evaluated with the grade 1+, if the grades mean as follows: 1) limited number – narrow range of functions – small client base; 2) limited – large range of functions – growing client base; 3) medium; 4) large- range of functions of innovation intermediaries includes information, funding, quality, design, etc. (IMT) constituting/advice, incubation, brokerage/IRP, technical services, transfer, testing and certification (standardisation), training on technology, prototyping, contract research.

These framework conditions correspond to the level of organisational development of the National Innovation System (NIS) in the country. The organisational analysis, carried out in previous chapters, shows that the role and functions (mission, tasks, position) of main actors are not enough well coordinated in the NIS. There is not sufficient complementarity between them. There is a lack of capabilities (in terms of personnel – quantity and level of specialisation, budget, legal structures). The orientation of NIS (sectors, target groups, type of innovation) is on its initial stage. The instruments (financing, stimulating, regulating) are on an early stage of development.

There are several structures, which could be developed for a better functioning of the innovation system in Bulgaria. But there is no coordination structure in this system. Such as is recommended by the project Innovation in Bulgaria: Strategy and Implementation.

## **4.2 Main steps to developing an innovation policy in Bulgaria**

### **4.2.1 Promoting a culture open to innovation in the country**

- Basic and applied research to be carried out mainly for foreign firms. Increased part of applied research to be directed mainly for domestic firms. Specialization to be identified on the base of in-country potential, foreign demand and national specialization as well as on National foresight;
- Improvements of efficiency of links between R&D and business sector. Assess needs in enterprise sector in terms of innovation awareness and management.

### **4.2.2 Place innovation at the hard of further reforms to the legal and regulatory environment**

- Establish a review procedure for existing and planned legislation with a view to assessing its impact on business innovation;
- Active cooperation with EU and other international partners in establishing action programmes to tackle the key obstacles to business innovation.

### **4.2.3 Increase the number and level of innovativeness of smaller enterprises**

- Provision of rapidly developing integrated industrial parks with logistics and utilities to meet investors' immediate needs;
- Supporting industry, based on clusters of SMEs that supply parts and components actively involving BCCI and BIA;
- Create seed and venture capital funds, linked to centres of research excellence, technology parks and incubators, support for hi-tech start-ups;
- Development of a package of investment incentives for innovation projects, including joint ventures able to receive credits lines and soft loans from other countries;
- Increase funding for inter-disciplinary education and training and innovation management courses. Further development of training programmes, incl. Ph.D. programmes, funded by business associations, further developing MA and BS programmes Management of innovation.

#### **4.2.4 Strengthen diffusion of knowledge and technology in the economy**

- Create initiatives in favour of industrial clusters or sub-contracting chains, in particular linked to foreign investment enterprises;
- Further efforts in development of the existing in the country technology transfer (incl. Educational, e.g. in ICT) centres as well as regional technology transfer centres for Balkan and Black sea region.

#### **4.2.5 Establish a policy making process conducive to developing innovation policy**

- Monitoring (organise and implement country innovation survey (CIS);
- Establishing an innovation policy unit for coordination of NIS, monitoring and coordination of the efficiency of policy maturity and policy delivery;
- Increase access to information for funding programmes or contracts for innovation projects.

# Annexes

## Annex 1 - List of people interviewed\*

Name	Position	Organisation	Contact details (e-mail, phone/fax)
Nikolay Vassilev, C.F.A.	Deputy Prime Minister and Minister of Economy	Government – Ministry of economy	<a href="mailto:n.vassilev@mi.government.bg">n.vassilev@mi.government.bg</a> Tel. 3592-9870387
A. Breshkov	Chief of Directorate Economic development and innovation	Ministry of Economy	<a href="mailto:a.breshkov@mi.government.bg">a.breshkov@mi.government.bg</a>
E. Radeva	Chief of Department Innovations	Ministry of economy	Tel (359 2) 9407567
Lili Ignatova	Chief department	Ministry of economy	<a href="mailto:lignatova@mi.government.bg">lignatova@mi.government.bg</a>
Boryana Mincheva, D.Sc.	Chief Department	Bulgarian trade promotion agency at the Ministry of Economy	<a href="mailto:Boby_m@bepc.government.bg">Boby_m@bepc.government.bg</a>
V. Mintchev	Secretary of economic affairs at the Presidency	Presidency	<a href="mailto:Vmintchev@president.bg">Vmintchev@president.bg</a>
Albena Vutsova	Chief, Directorate Science policy	Ministry of education and science	<a href="mailto:a.vutsova@minedu.government.bg">a.vutsova@minedu.government.bg</a>
Prof. D.Sc. Alexander Popov	Member of EU Program Committee: Promotion of Innovation and enlargement of Participation of SMEs	Bulgarian Academy of Sciences	Tel.& 359 2 - 9898446
Prof. Kamen Fillyov, Ph.D., D.Sc.	Executive director	Technology Centre- Institute of Microelectronics	<a href="mailto:Kamen@tcime.bg">Kamen@tcime.bg</a> , Tel:3592-9743179
George Shivarov	Deputy chairman	Bulgarian industrial association	<a href="mailto:Georgi@bia-bg.com">Georgi@bia-bg.com</a>
Tanya Karagyozyova	Directorate Market regulation	Commission for regulation of telecommunications	9492448 <a href="mailto:tkaragyozyova@crc.bg">tkaragyozyova@crc.bg</a>
Prof. Snejanka Grozdanova	Chair Women in Industry	Bulgarian federation of unions for science and technology	<a href="mailto:Bvbengin@sbline.net">Bvbengin@sbline.net</a>
Prog. Peyo Ralinsky	Executive director	Institute for information systems	<a href="mailto:Pralinsky@iis.bg">Pralinsky@iis.bg</a>
Assoc. Prof., Dr. Snejana Hristova	Director	Business Innovation Centre – IZOT (private entity)	<a href="mailto:Biz-izot@bg400.bg">Biz-izot@bg400.bg</a>



Name	Position	Organisation	Contact details (e-mail, phone / fax)
Dr. I. Kurtev	Deputy Director	BIC-IZOT	<a href="mailto:Bic-izot@bg400.bg">Bic-izot@bg400.bg</a>
K. Todorov	Centre for entrepreneurship	Director	Ktodorov@unwe.bg
Dr. M. Dimitrov	Bulgarian association for management and entrepreneurship	President	m.dimitrov@iki.bas.bg
Prof., D.Sc. Alexander Dimitrov	Chairman of the Statistical Council	National Statistical Institute	Al-dim@infotel.bg
Prof., D.Sc. Damian Damianov	President	Union of Scientists in Bulgaria	<a href="mailto:Science@bitex.com">Science@bitex.com</a>
Prof., D.Sc. Garabed Minassian	Governor	Bulgarian National Bank	<a href="mailto:Gminasian@iki.bas.bg">Gminasian@iki.bas.bg</a>
Prof., D.Sc. Hristo Balarev	Former deputy minister of science	Bulgarian Academy of Sciences	<a href="mailto:Balarev@svr.igic.bas.bg">Balarev@svr.igic.bas.bg</a>
Prof. Ivan Angelov, D.Sc.	Member – correspondent	Bulgarian Academy of Sciences	Angelov@iki.bas.bg

*The opinion of people from the Government is presented in the commented official documents.*

## Annex 2 - List of documents received and consulted

Title	Author/organisation	Year of publication	Availability (indicate by an * if not publicly available, publisher, language of publication, web-address if relevant)
Report of the European Commission on the progress towards accession by each of candidate countries	European Commission	09.12.2002	Brussels, SEC/2002/1400-1412, <a href="http://www.cordis.lu">http://www.cordis.lu</a>
European Innovation Scoreboard 2002	EC	2002	Cordis focus suppliment <a href="http://www.cordis.lu/scoreboard2002/html">http://www.cordis.lu/scoreboard2002/html</a>
Innovation in Bulgaria. Strategy and implementation - Project	Ministry of economy and Ministry of education and sciences in cooperation with experts from the Netherlands	2002, October	<a href="http://www.mi.government.bg">http://www.mi.government.bg</a> (Available in Bulgarian and English)
Key priorities of the Government programme “People are the wealth of Bulgaria”	Government of the Republic of Bulgaria	October, 2001	<a href="http://www.government.bg">http://www.government.bg</a> (Available in Bulgarian and English)
Panorama of Bulgarian manufacturing industry	Ministry of economy	2002	<a href="http://www.government.bg">http://www.government.bg</a>
National anti corruption strategy	Government of the Republic of Bulgaria	2002	<a href="http://www.government.bg">http://www.government.bg</a> (Available in Bulgarian and English)
National strategy for information society development	Ministry of telecommunications	1999	<a href="http://www.mtc.government.bg">http://www.mtc.government.bg</a> , (Available in Bulgarian and English)
Hi-tech development in Bulgaria	Ministry for economy	1999	<a href="http://www.mi.government.bg">http://www.mi.government.bg</a> (Available in Bulgarian and English)
Technology policy. Capacity building for accelerated growth of the SME sector in Bulgaria	EC Discussion paper	September, 2001	Available in English
Competitiveness of the Bulgarian economy	Centre for economic development	Annual report 2001, publicly presented on 25 <sup>th</sup> of January, 2002 in Sofia.	<a href="http://www.ced.bg">http://www.ced.bg</a> (Available in Bulgarian and English)

Title	Author/organisation	Year of publication	Availability (indicate by an * if not publicly available, publisher, language of publication, web-address if relevant)
Analyses of the SME sector and of the state policy support to SME development in BG	Bulecoproject Ltd, commissioned by WB	June, 2001	Available in English
Statistical yearbooks	National statistical institute	2000, 2001	National statistical institute(available in Bulgarian and English)
Annual reports of BAS	BAS	1990 – 2001	BAS, available in Bulgarian
Bulgaria 2000. Socio-economic development	National Statistical Institute	2001	NSI, 2001 /in Bulgarian/
Measures for improving the business environment and stimulating the economy until the mid 2003	Nicolai Vassilev – deputy Prime Minister and the Minister of the economy	18.10.2002	<a href="http://www.government.bg">http://www.government.bg</a> Capital, 19-25.10.2002
Competitiveness of the Bulgarian economy	Centre of economic development	Dec., 2001	Bulgarian
Code of best SME financial practices in South Eastern Europe	Centre for economic development	2001	English
Corruption in Transition. The Bulgarian experience	USAID Partners in Transition, Conference	2001	English
Declaration for economic problems of development of science and high education in Bulgaria	Union of Scientists in Bulgaria (USB)	October, 27, 2001	Newsletter of USB, 2001/15 (1) (in Bulgarian)
Declaration for retire on the pension	Union of Scientists in Bulgaria (USB)	October, 27, 2001	Newsletter of USB, 2001/15 (1) (in Bulgarian)
Declaration for young people in science	Union of Scientists in Bulgaria (USB)	October, 27, 2001	Newsletter of USB, 2001/15 (1) (in Bulgarian)
Information society	Foundation IRC	2001	<a href="http://www.ispo.bg">http://www.ispo.bg</a> , Bulgarian
The Project “Dynamic entrepreneurs: comparative study of Bulgaria and Poland”	University of National and World Economy	1999-2000	Centre for Entrepreneurship Development, available in Bulgarian
Innovation.bg	Foundation “Applied research and communications (IRC)”	2001	Bulgarian, <a href="http://www.innovation.bg">http://www.innovation.bg</a>
Microeconomic environment for business in Bulgaria	IME, Y. Gancheva, Lbogdanov	2001	Institute of market economy (English)

Title	Author/organisation	Year of publication	Availability (indicate by an * if not publicly available, publisher, language of publication, web-address if relevant)
News	European innovation centre	2001	<a href="http://www.irc.bg">http://www.irc.bg</a> Bulgarian
SMEs and competition	Centre for economic development	2001	Bulgarian <a href="http://www.ced.bg">http://www.ced.bg</a>
Strategy for Information society development	Government of the Republic of Bulgaria	1999	<a href="http://www.government.bg">http://www.government.bg</a> (In Bulgarian and English)
USB international conference on science in South-Eastern Europe	Conference paper	2001	USB (in English) - book
USB position on science and higher education	USB	26.10.2001	USB (in Bulgarian) – in journal Science
Integration of macroeconomic and S&T policies for growth, employment and technology	5FP	Draft results, 2002	Available only for participants of the project. Not publicly available.
Barriers to innovation	R. Chobanova	1999	From invention to innovation, (ed. A. Inzelt, J. Hilton) KLUWER (in English)
Barriers to innovation	A. Dimitrov, R. Chobanova, P. Naidenova, T. Lekova, R. Kazandjieva / PHARE project	1996	Institute of economics, Bulgarian Academy of Sciences (in Bulgarian)